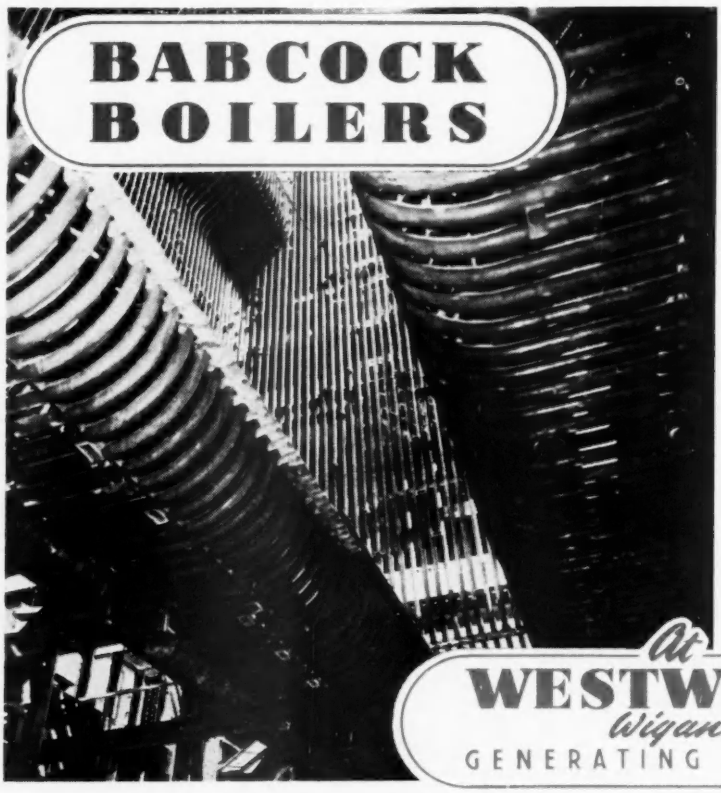
ELECTRICAL TIMES

THURSDAY
22 NOV.
1951
NINEPENCE



At
WESTWOOD
Wigan
GENERATING STATION

Westwood generating station, which is being equipped with BABCOCK boilers, is one of the many important stations of the British Electricity Authority for which BABCOCK & WILCOX, LTD. are supplying not only the boilers but also the coal pulverising plant, pipework and cranes, and the coal, ash and dust handling equipment; an indication of the ***comprehensive service*** offered by the BABCOCK organisation.

The boiler installation comprises five BABCOCK High Head boilers, pulverised fuel fired, with a total capacity of 1,500,000 lb./hr. M.C.R at 625 lb./sq. in. at 860°F.

BABCOCK & WILCOX LTD., BABCOCK HOUSE, FARRINGDON ST., LONDON, E.C.4

TOP MARKS for NO SCORE

Patents applied for

Simplex No-Score lampholder L.504, L.505. Skirted, E.S. or G.E.S. type

Fitting a screw type lamp into a porcelain holder has always been one of those fiddling jobs. More often than not the lamp has been rubbed against the porcelain which scores the envelope. Sooner or later the weakened glass snaps off

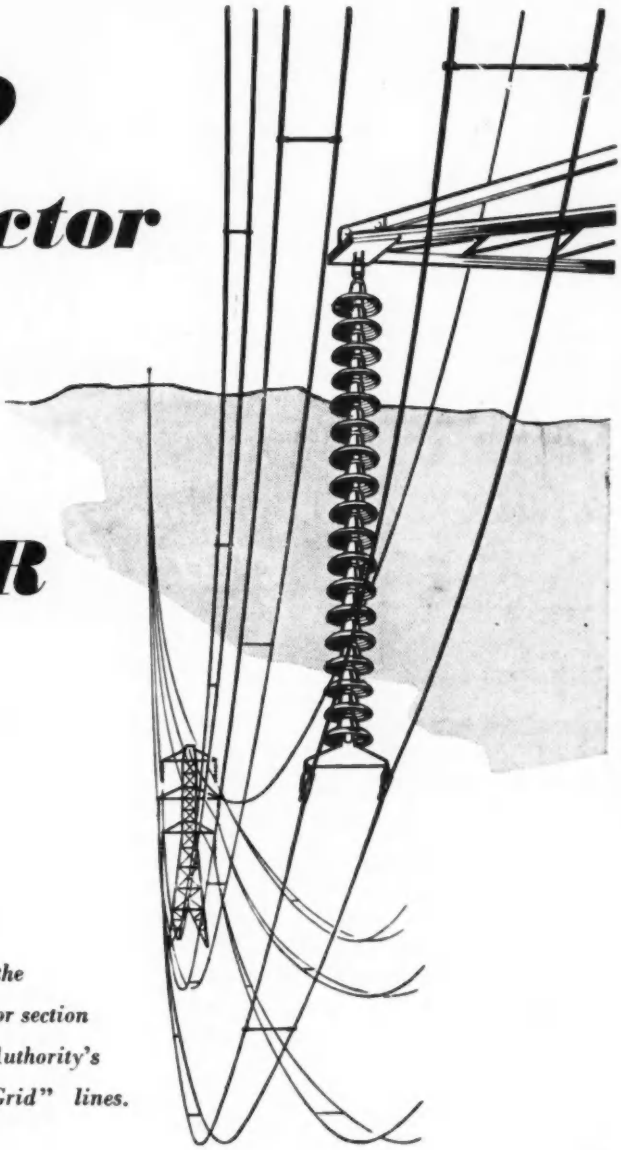
Simplex now coat the rims of their lampholders with a metal spray. The result? The Simplex 'No-Score' Lampholder. Simple idea, of course, but it's very effective and what is more no extra cost is involved

MADE BY THE HOUSE OF Simplex

Simplex Electric Company Limited
Oldbury Birmingham and Branches

A COMPANY

AWCO conductor for the SUPER grid



Aluminium Wire and Cable Co. Ltd. are supplying Steel-Cored Aluminium conductor for the West Melton – Barnby Moor section of the British Electricity Authority's first 275 KV "Super-Grid" lines.

AWCO REGD TRADE MARK

Manufactured by
ALUMINIUM WIRE & CABLE CO. LTD
Head Office and Works: **PORT TENNANT, SWANSEA, GLAM**
Sales Office: **37 THURLOE STREET, SOUTH KENSINGTON, LONDON, S.W.7**
Telephone: KNIghtsbridge 1721-4

210-35 A

INTRODUCING!

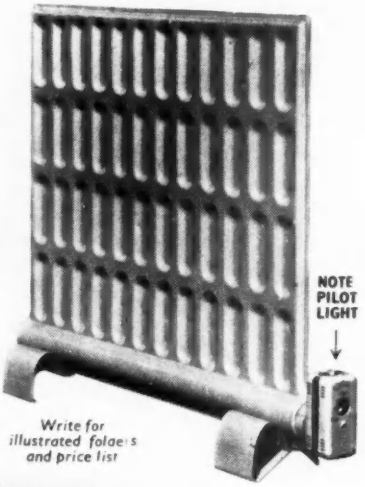
ADDITIONAL DIMPLEX MODELS

REDUCING!

DIMPLEX PRICES DOWN

Example : 1 kW. Panel model (as illustrated) reduced from £25. 2. 0d. to £24. 4. 9d. ½ kW. model also reduced.

New models — *reduced* prices — plus the proved selling power of 'plug-in' central heating ! Dimplex dealers are going to be busy this winter—and they are backed by National Advertising in all the leading magazines.
NEW Dimplex Column type radiators also available in limited quantities.



Write for illustrated folders and price list

BUILDING EXHIBITION OLYMPIA
November 14th—28th
STAND No. 481
Gallery, Grand Hall

THERMOSTATICALLY CONTROLLED
dimplex
OIL-FILLED **ELECTRIC RADIATORS**

Dimplex Ltd., Dept. E.T., Totton, Southampton, Hants. Tel. Totton 2481.

OPPORTUNITY

Brown Porcelain
LINE INSULATORS
IN STOCK!
PRICE 9D *EACH*

FOR QUANTITIES OF 5,000 OR MORE

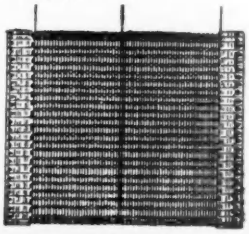
These brand new American pattern Insulators measure approximately 5¼" overall and are fitted with a 2½" galvanised wood screw which is lead set into the porcelain base. The porcelain portion measures 3" x 1⅛" and the aperture will accommodate ¼" cable.

CASHMORES
JOHN CASHMORE LTD · GREAT BRIDGE · TIPTON · STAFFS
Tel. TIPTON 2181 (5 lines) Ext. 18

CE185

ASBESTOS WOVEN
WIRE RESISTANCE NETS

Speedily supplied from stock, or 'made to measure' at a cost that will please you. Our Technical Service will help you with any problems.



CRESSALL
Registered Trade Name of—
The CRESSALL MANUFACTURING CO., LTD.
Tower Street, Birmingham 19
Telephone : ASTon Cross 2666 (3 lines.)
Telegrams : OMHIC, BIRMINGHAM

How much longer for those work benches?

Storage - No! Standard racks won't do!

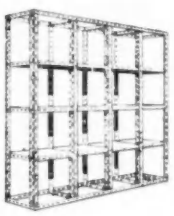
Those tables - ordered a month ago!

Partitions - No, we haven't the timber!

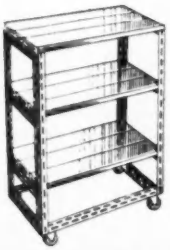
That machine guard - it doesn't fit!

***why worry? use* DEXION**
SLOTTED ANGLE

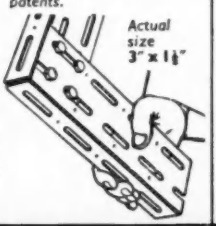
It's an inspiration—this Dexion idea for making your own equipment! Cuts out delays. Cuts costs to a fraction. No need for any particular skill. No need for any but the simplest tools.

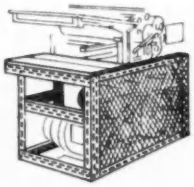


With a small stock of Dexion you can solve all kinds of equipment problems—on the spot—simply by cutting Dexion Angle to lengths required and bolting them together.



DEXION ANGLE
is protected by Brit. No. 620696 and world patents.





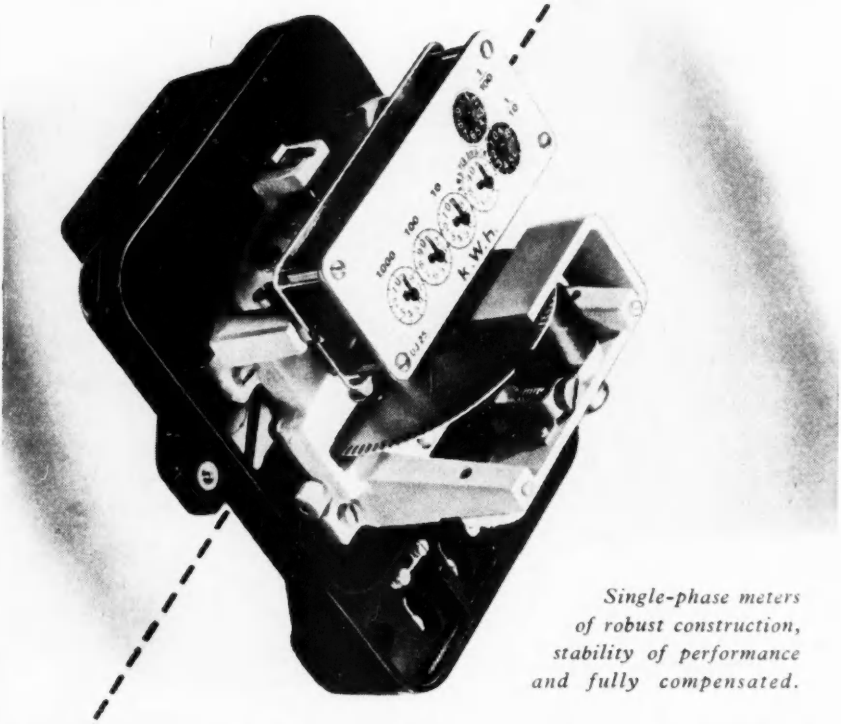
Write or 'phone for Illustrated Folder H.6. Better still, come and see an actual installation (no appointment needed) at: 34, Fouberts Place, W.1. (Near Liberty's.)

DEXION
LIMITED
TRIUMPH HOUSE, 189 REGENT ST. LONDON, W.1.
Telephone: REGent 4841-5
Telegrams: Dexion, Piccy, London

T.A. 3522

We are one Company operating in three different fields. In this, and the next advertisement, we illustrate products of the Electricity Meter Division.

GROWTH BY DIVISION

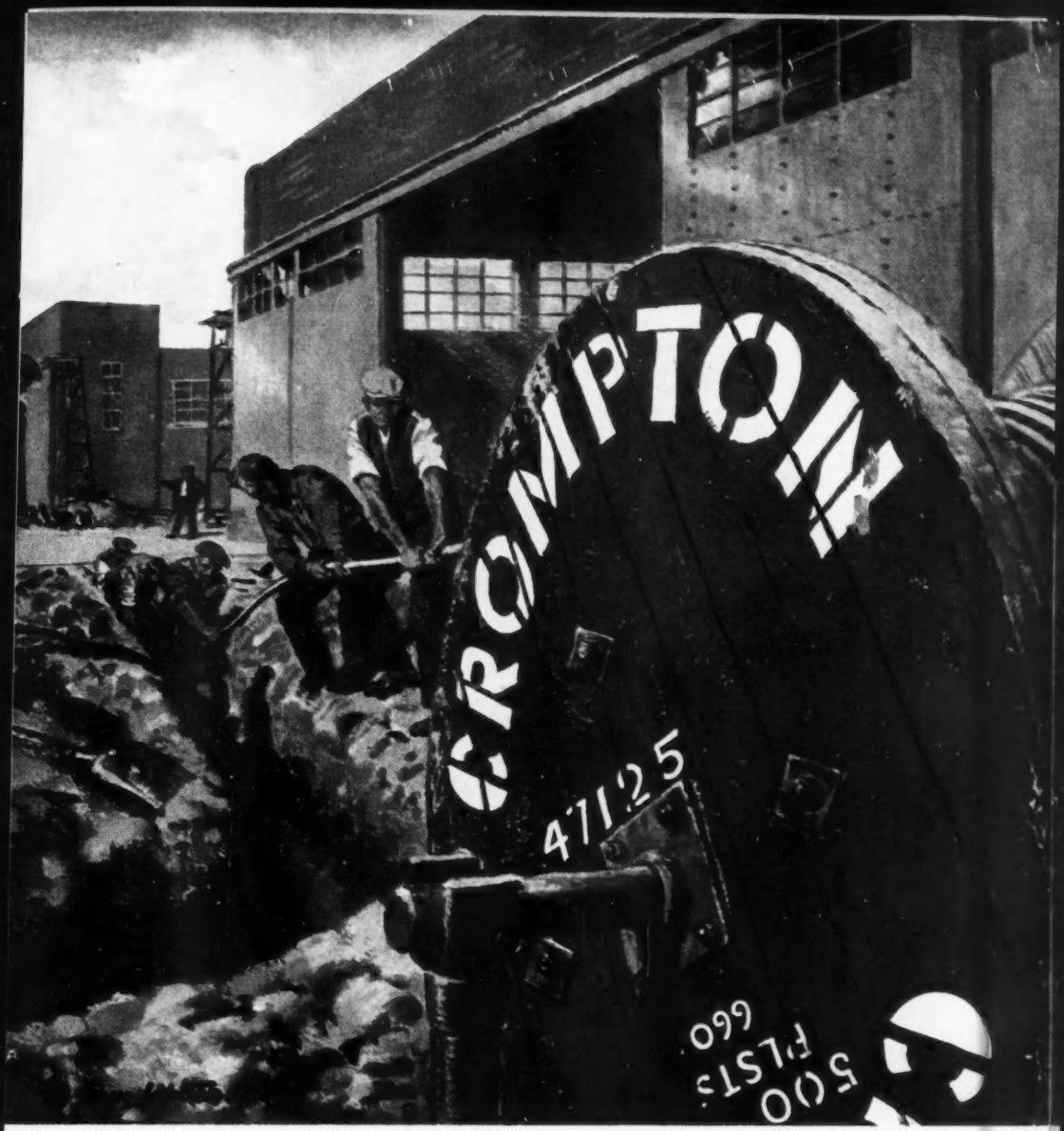


Single-phase meters of robust construction, stability of performance and fully compensated.

MEASUREMENT LTD

ELECTRICITY METER DIVISION, Tameside Works, Dobcross, Near Oldham, Lancs. Tel. No. Delph 291
HYDRAULICS DIVISION, 119 Union Street, Oldham, Lancs. Tel. No. Manchester Main 6432
REMOTE CONTROL DIVISION, Fitzalan St. Works, Kennington Road, London, S.E.11. Tel. No. Reliance 2406

A Company of the Parkinson & Cowan Group



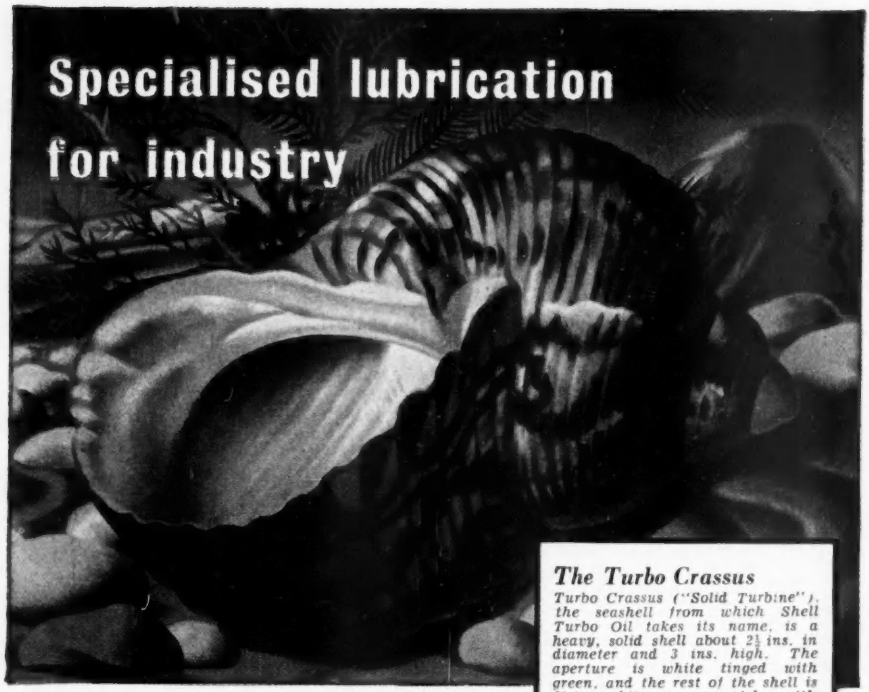
GOING IN FOR A LONG INNINGS

Crompton

PAPER CABLE

CROMPTON PARKINSON LTD., CROMPTON HOUSE, ALDWYCH, LONDON, W.C.2.

Telephone : CHAncery 3333 *Telegrams : Crompark Estrand, London*



The Turbo Crassus

Turbo Crassus ("Solid Turbine"), the seashell from which Shell Turbo Oil takes its name, is a heavy, solid shell about 2½ ins. in diameter and 3 ins. high. The aperture is white tinged with green, and the rest of the shell is dirty white or greenish, with angular black or brown patches on the ribs. Found off the coasts of North Australia and New Caledonia.

SHELL TURBO OIL

SHELL TURBO OILS are highly refined oils containing anti-oxidant and anti-rust additives. They separate readily from water during prolonged service and have outstanding oxidation stability. Available in a range of viscosities, they are recommended for steam, gas and water turbines, bearings of high speed enclosed crankcase steam engines, and certain other circulating systems where oils of turbine quality are required. Shell Turbo Oils are approved by all the leading turbine builders.

The wide Seashell range of specialised industrial lubricants is marketed in nearly every country of the world. There is a Seashell grade for *every* industrial use—and each is available everywhere in the same high quality.

SHELL LEADERSHIP IN LUBRICATION

WORLD-WIDE INDUSTRIAL RESEARCH

Seashell Oils are produced as the result of *world-wide research*. At Shell's great Thornton Research Centre, and at other Shell Research Centres in Europe and America, scientists and technicians spend their lives studying the special lubrication needs of every branch of industry. The rewards of this research are the Seashell oils—each developed to solve a *specialised* lubrication problem. This is the solid basis upon which Shell has built up its world-wide *leadership in lubrication*.

CALL IN A SHELL LUBRICATION ENGINEER

Shell Lubrication Engineers will be pleased to provide further information and to make specific recommendations for particular purposes. You can be sure of Shell lubrication—it is *specialised* lubrication.

7-Range
CLIP-ON AMMETER
Type L

This model is specially designed for use with porcelain clad fuses and heavy duty conductors up to 4" dia.

Fully insulated core.

PLEASE WRITE FOR LIST IN17L.

7 RANGES

0 — 10
0 — 25
0 — 50
0 — 100
0 — 250
0 — 500
0 — 1000
Amperes A.C.

FIBS

FERRANTI

FERRANTI LTD. HOLLINWOOD LANCS.
LONDON OFFICE: KERN HOUSE, KINGSWAY, W.C.2.

B

TRADE MARK

HIGGS MOTORS LTD

CHAIRMAN WALTER F HIGGS M.I.E.E.

BIRMINGHAM 6 ENGLAND

Our fractional HP motors combine the essential features of compactness and high efficiency with outstanding reliability: fully reviewed in Specifications 100 & 102 and

GUARANTEED FOR EVER

Belfast, Birmingham, Bristol, Dundee, Glasgow, London, Manchester, Newcastle, Peterborough, Sheffield, Wolverhampton

Preparing insulation rubber in the General Cables factory.

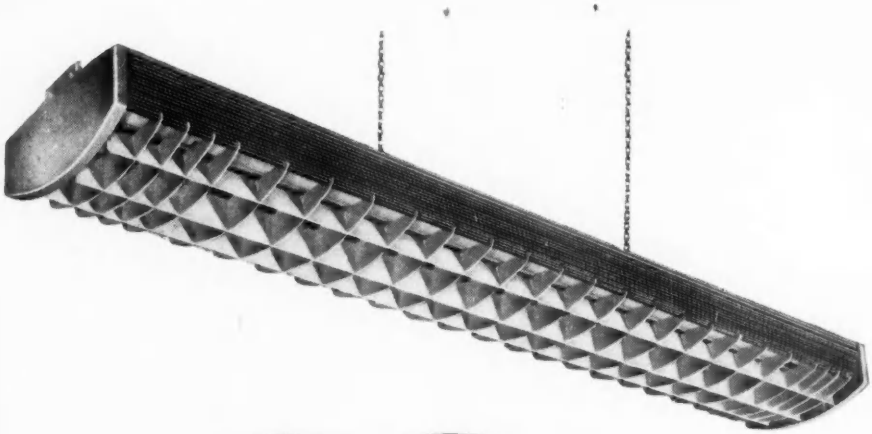
KEEPING IN STEP

During the last war when resources were strained to provide cables for the Forces, we were enabled to modify and improve our machinery. To-day General Cables plant is among the most modern in the country and operated by craftsmen trained in its use. The result, very naturally, is that General Cables products are second to none — in quality, consistency, and reliability.

GENERAL CABLES

MADE AT LEATHERHEAD

The General Cable Manufacturing Co. Ltd. Leatherhead, Surrey. 'Phone: Leatherhead 3021/4. 'Grams: "Isolde" Leatherhead. Depots at 204/206 Newhall St., Birmingham. 54a Newton St., Manchester. 55/63 Washington St., Glasgow, C.2



A new
SMART & BROWN
commercial unit

Introducing fluorescent fitting catalogue number LF.25 for two 5ft. 80-watt lamps.
Quick release spring-loaded louvre for easy cleaning and maintenance. Graduated louvre cells. Luminating glass side panels. SMART & BROWN Hi-Craft guaranteed control gear.

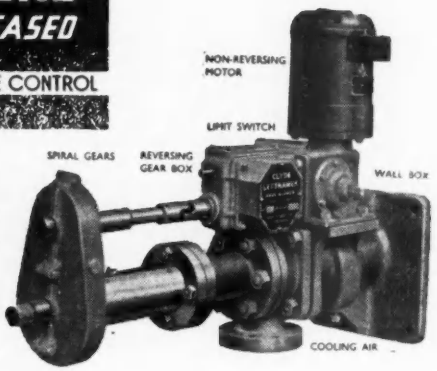
Price £14-0-0 less lamps
Plus £1-15-7 purchase tax

SMART & BROWN *(ENGINEERS)* LIMITED
TRADING ESTATE, SPENNYMOOR, CO. DURHAM

ARON
Preference
REQUISITION TO PURCHASING DEPARTMENT
THE FOLLOWING INSTRUMENTS ARE REQUIRED URGENTLY
METERS ARON TYPE el
TEMPERATURE COMPENSATED
25 AMPS. 200/250 v. 50 ~
REASONS FOR PREFERENCE
The present el meter represents the result of 20 years' continuous research. During this period improvements have been made from time to time and, whilst retaining the proved basic design, further modifications have now been made to attain unparalleled performance under all conditions, the latest refinements are improved vernier adjustment and complete compensation for temperature changes.
Another
METER TEST DEPT.
TEMPERATURE COMPENSATED
METERS
ARON ELECTRICITY METER LTD.
72-82 Salusbury Road, Kilburn, London, N.W.6

Clyde SOOT BLOWERS
BOILER AVAILABILITY INCREASED

ELECTRO-MECHANICAL OPERATION with SEQUENCE CONTROL



Improvements Over Manual Operations

1. No physical exertion required.
2. Soot blowing carried out in a quarter of the time.
3. Shorter period of abnormal combustion conditions.
4. Cleaner heating surfaces with higher and sustained rate of evaporation.
5. Saving in fuel and labour costs.
6. Increased boiler availability.

London—
34 VICTORIA ST., S.W.1
Telephone: ABBEY 1847

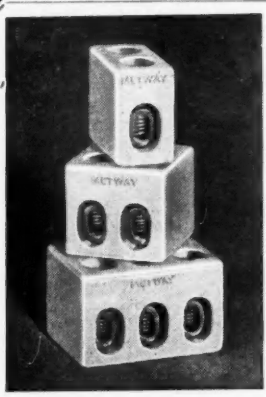
Manchester—
1, CHANCERY LANE, SPRING GARDENS
Telephone: DEAnsgate 4262

★

Clyde BLOWERS Ltd

LIVINGSTONE STREET, CLYDEBANK
'Phone: CLYDEBANK 1576/77 'Grams: 'MURWILS GLASGOW

METWAY PRODUCTS
Regd. Trade Mark



CHINA CONNECTORS

5 AMP.—15 AMP.—30 AMP.
ONE, TWO & THREE WAY

ALSO

TWO-WAY SINGLE HOLE FIXING

Strange to say—**DELIVERY FROM STOCK** *at the moment!*

Please send 6d. stamps to cover postage for our

92-page LIST No. OH/31/JJ3/T.E.

METWAY ELECTRICAL INDUSTRIES LTD.
KING STREET, BRIGHTON 1

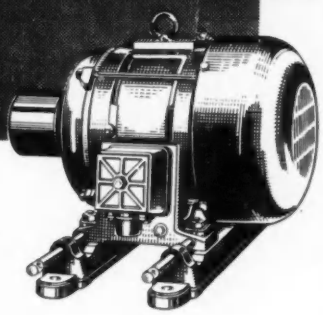
Telephone: Brighton 28366 (7 lines) *Grams: "Metway, Phone, Brighton"*

THE RIGHT START . . .

A BROOK PRODUCT

Automatic Star-Delta Starter for three phase supply.

and THE RIGHT MOTOR



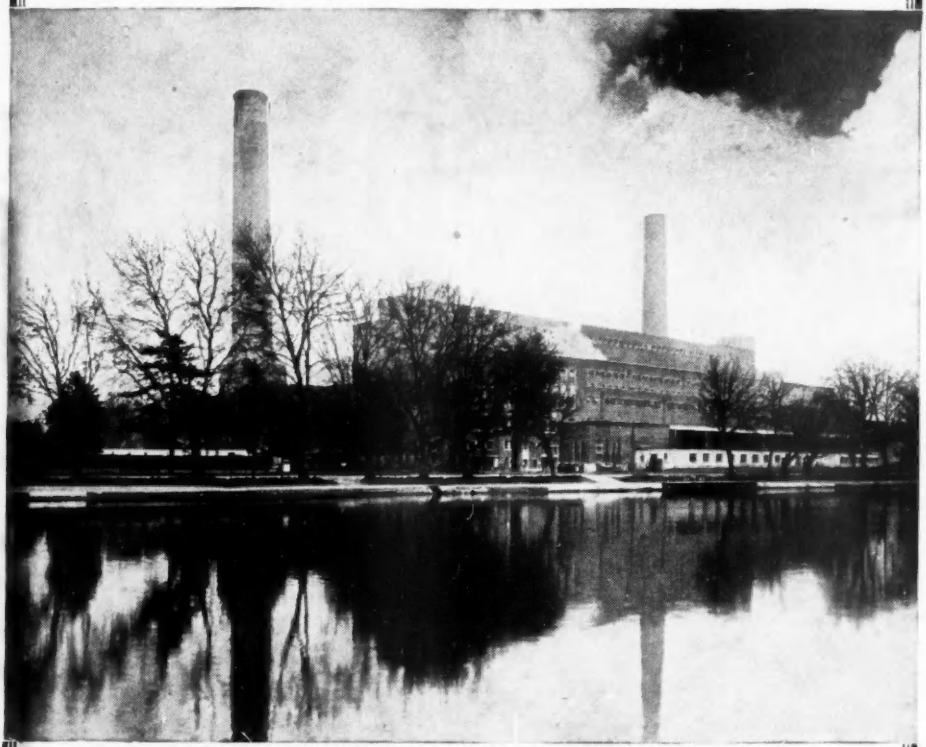
Totally Enclosed Surface Cooled Motor - a reliable machine for difficult situations. Undaunted by damp, grit or excessive dust. Used with a BROOK starter makes an ideal combination for long term service with little maintenance.

BROOK MOTORS Ltd

HUDDERSFIELD • ENGLAND

1. KQ. 204

WAKEFIELD OIL FOR INDUSTRY



The main turbines and ancillary equipment of the Kingston Power Station are lubricated exclusively with Wakefield Industrial Lubricants.

British Electricity Authority use

C. C. WAKEFIELD AND COMPANY LIMITED · LONDON · W.1

Urchfont Manor

Built in the transitional period between Elizabethan and Georgian styles, Urchfont Manor, near Devizes, is a typical small William-and-Mary manor house. Purchased by the Wiltshire County Council in 1946, it is now used as a residential college for adult education.

Electrical Contractors:
Moore & Bush (Electrical) Ltd.
Trowbridge

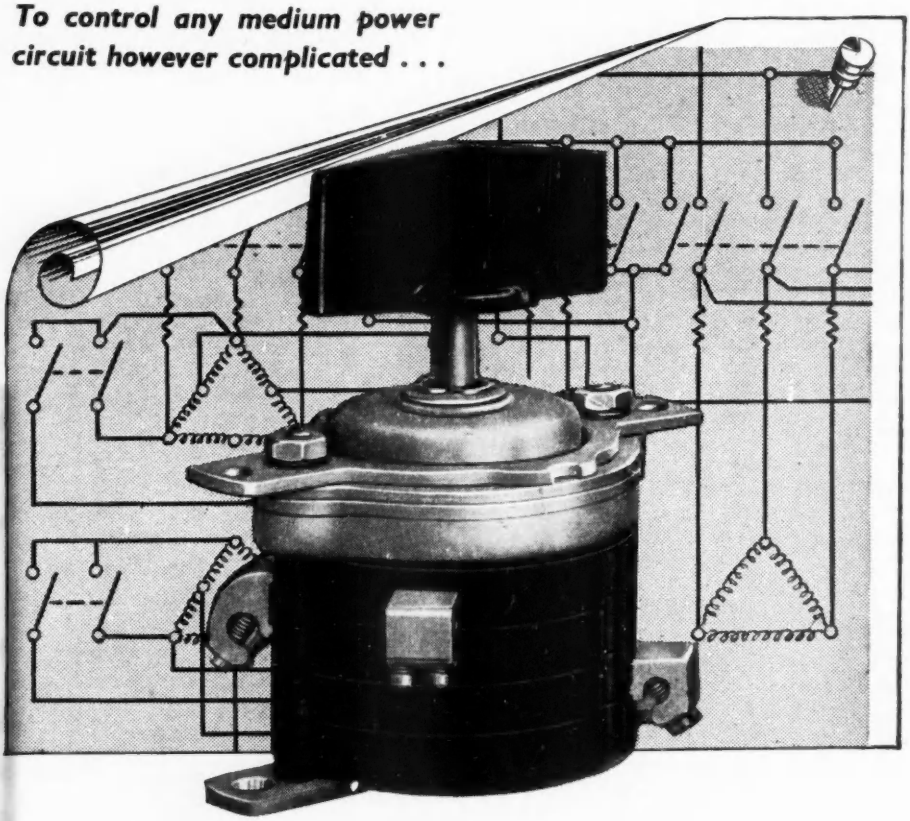
wired throughout with

B.I. Callender's

RUBBER INSULATED CABLES

BRITISH INSULATED CALLENDER'S CABLES LIMITED
NORFOLK HOUSE, NORFOLK STREET, LONDON, W.C.2.

To control any medium power circuit however complicated . . .



. . . there is a ready-made type of

SANTON ROTARY SWITCH!

SANTON switches operate on a simple rotary movement.

SANTON switches have large, easily accessible terminals, plainly marked.

SANTON switches are available from 10-60 Amps. (180 under special conditions), any number of poles up to six positions—up to 660 volts.

SANTON switches can be delivered promptly and give years of trouble-free service.

Most areas have a SANTON Resident Engineer who will be pleased to call and discuss your switching problems with you. Take the first step today towards simpler, more efficient control.

TRADE MARK: SANTON

Write or phone

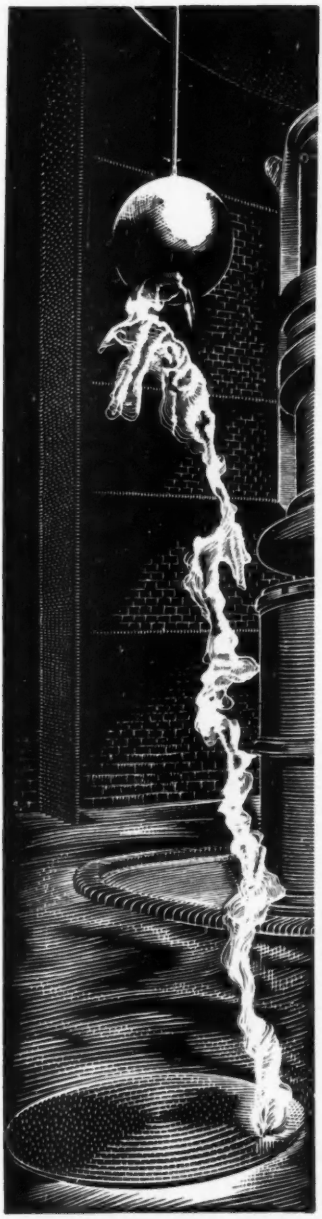
SANTON LTD., NEWPORT, MON. ***Tel. 71711 (10 lines)***

London: Sloane 2158 *Manchester: Central* 1394/5

Leeds 59361 *Birmingham: Midland* 6421 *Torquay* 7100

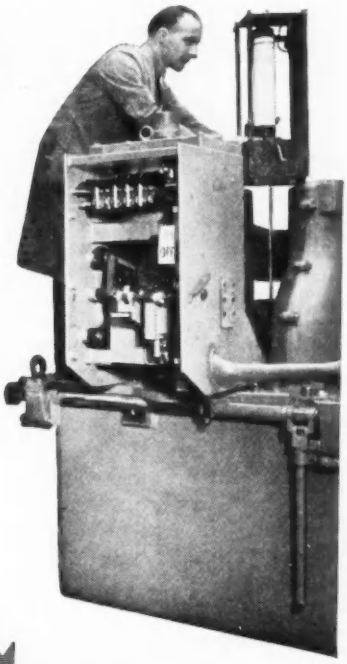
NEWPORT SANTON MON (ENG)

17161



A thou is as good as a mile

We split hairs at Reyrolle. We nag about tolerances and generally keep our men on their toes with the most thorough system of testing we can devise. On the whole, we have things so well organised that testing is a routine matter, but now and again . . . it happens. A flaw is located. It may be — and usually is—very small, but we're not the kind to let it slide. Not until the flaw has been completely eradicated do we let up. If needs be, we are prepared to strip equipment down and begin again from the ground up. All of which gives us the right to make the claim that every piece of Reyrolle equipment is a first class job.



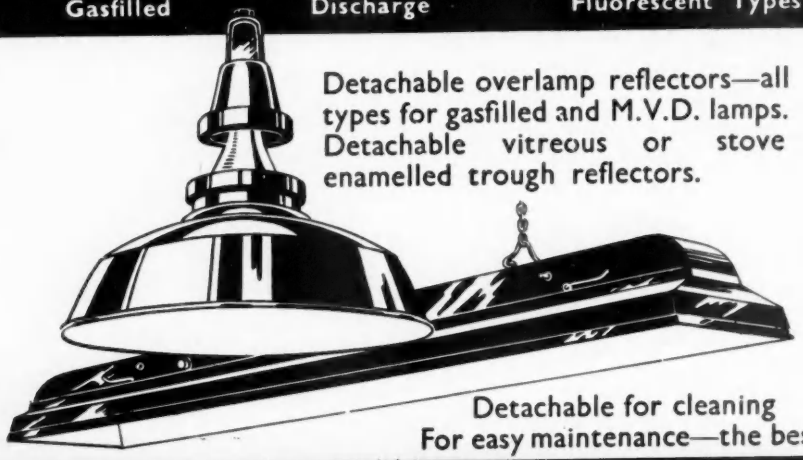
REYROLLE

A. REYROLLE & CO. LTD · HEBBURN · CO. DURHAM.

SWITCHGEAR

CRC 35

THORLUX INDUSTRIAL LIGHTING EQUIPMENT. Manufacturers of Gasfilled Discharge Fluorescent Types



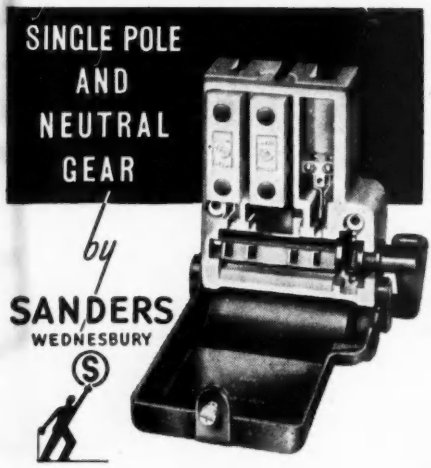
Detachable overlamp reflectors—all types for gasfilled and M.V.D. lamps. Detachable vitreous or stove enamelled trough reflectors.

Detachable for cleaning
For easy maintenance—the best.

F. W. THORPE LTD. WELBY RD HALL GREEN **BIRMINGHAM 28**

SPRINGFIELD 3318 GRAMS: THORLUX B'HAM

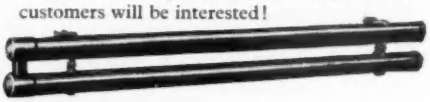
SINGLE POLE AND NEUTRAL GEAR by SANDERS WEDNESBURY



ALL-INSULATED SPLITTER WITH 15 AMP. OUTGOING FUSES
21 AMP. SWITCH
LIST NO. N.401 G.

FOR *draught* PREVENTION

Thermotube Electric Heaters are ideal for draught prevention and general temperature rise in smaller rooms, passages and landings. Tubes may be mounted singly or in banks of two, three or four, *without the need for changing terminal boxes.* This flexibility of installation is an important and appealing feature of Thermotubes, which can ease many a heating problem this winter. Your customers will be interested!

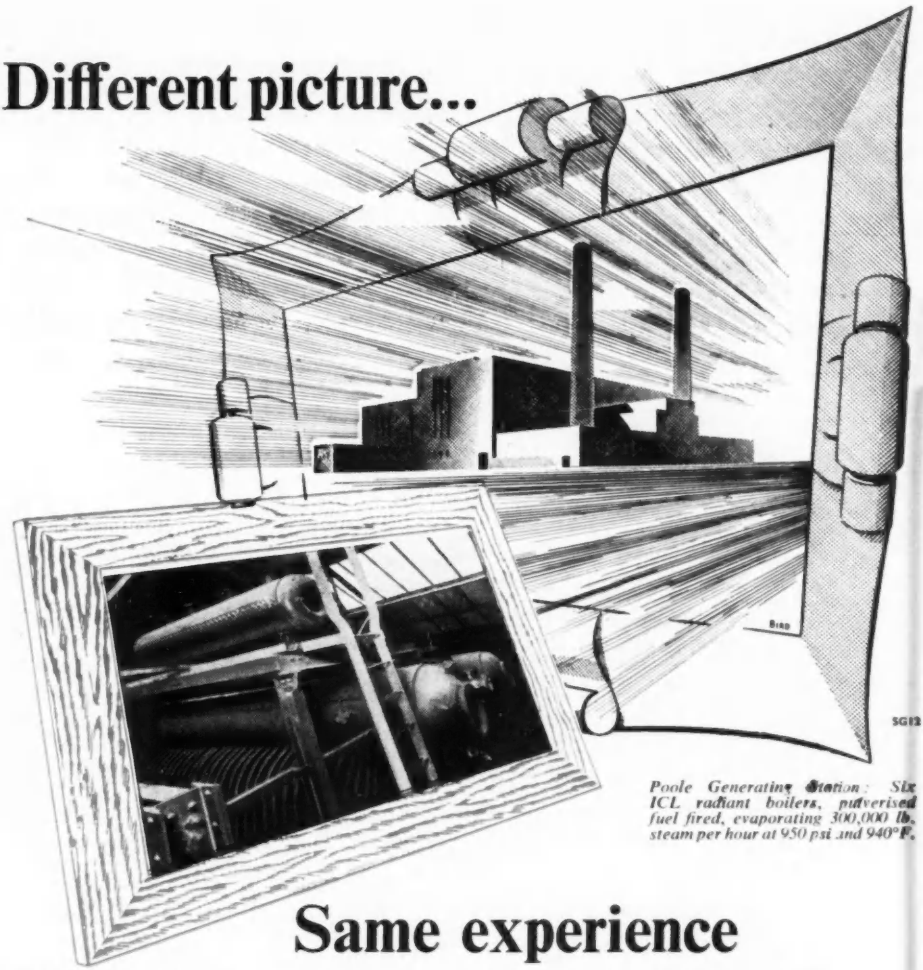


Thermotube
ELECTRIC HEATERS

The Thermovent Technical Advisory Service is always glad to help you with any problem of Space Heating.

THERMOVENT HEATING:
E. K. COLE LTD., 5 VIGO STREET, LONDON, W.1.

Different picture...



Poole Generating Station: Six ICL radiant boilers, pulverised fuel fired, evaporating 300,000 lb. steam per hour at 950 psi and 940°F.

Westfield Paper Mill: One stoker fired boiler evaporating 37,500 lb. steam per hour at 260 psi and 750°F.

Same experience

The scene may vary but the creative spirit and experience remain the same. It is through the knowledge and advanced thinking of ICL engineers that steam generation plants like those at Poole in Dorset came into being. Experience gained on great projects like this brings the benefits of economy and improved combustion to industrial users large and small. Today, ICL steam generating equipment—like the many other products of the organisation—is fulfilling the high trust placed in it all over the world.

ICL

INTERNATIONAL COMBUSTION LIMITED

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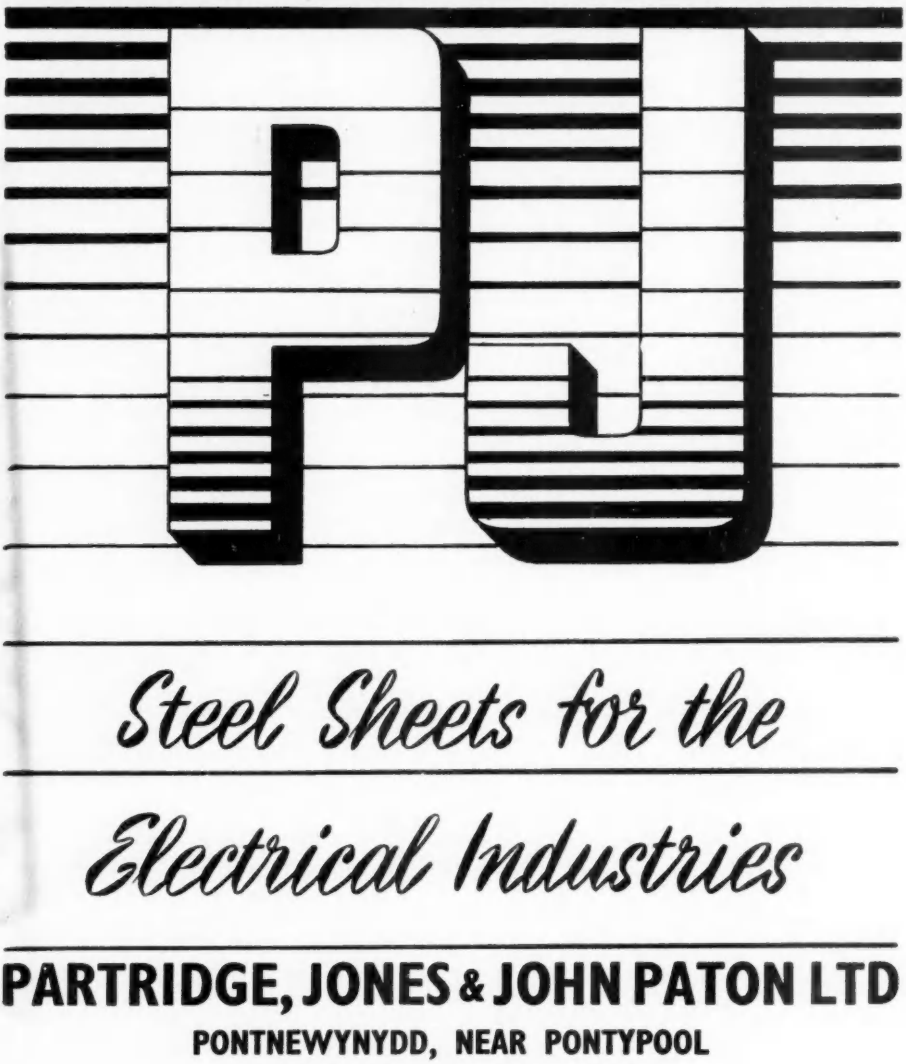

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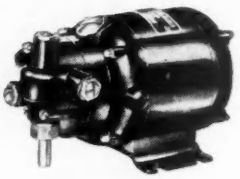

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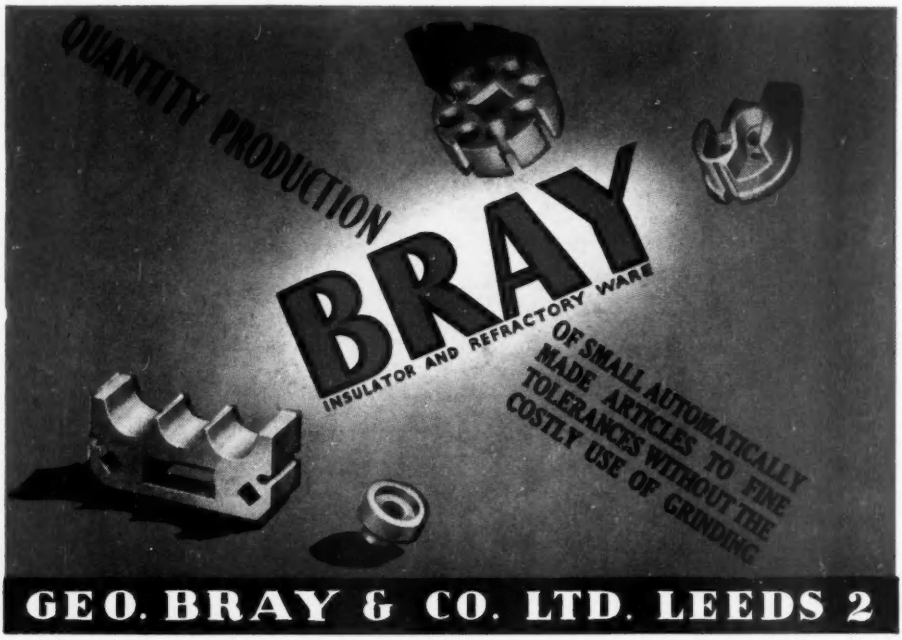
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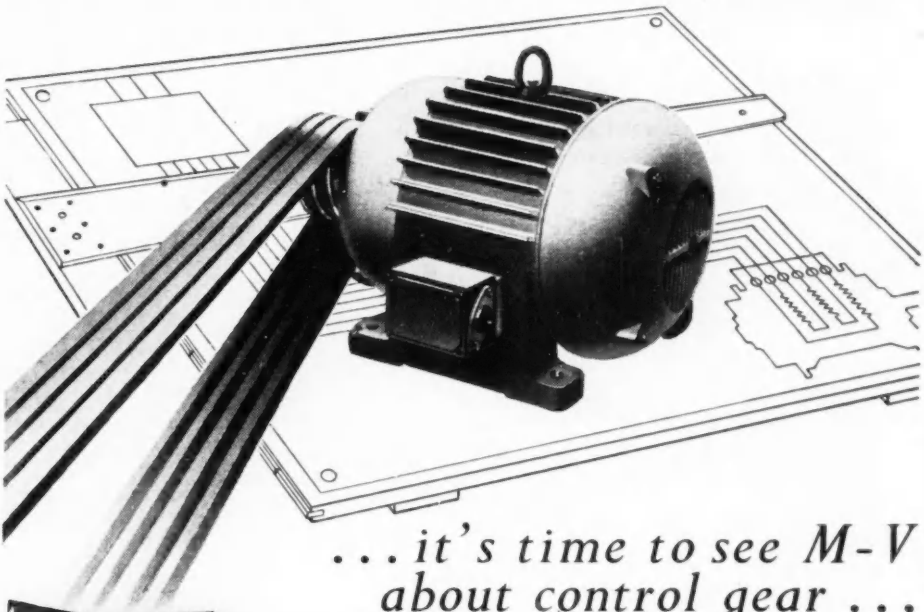

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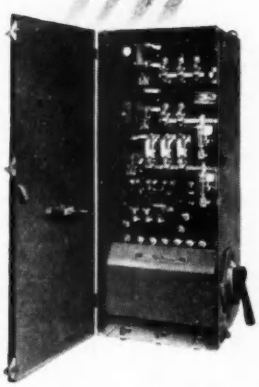

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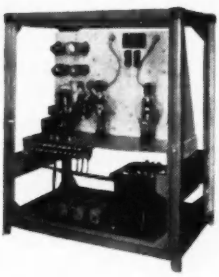

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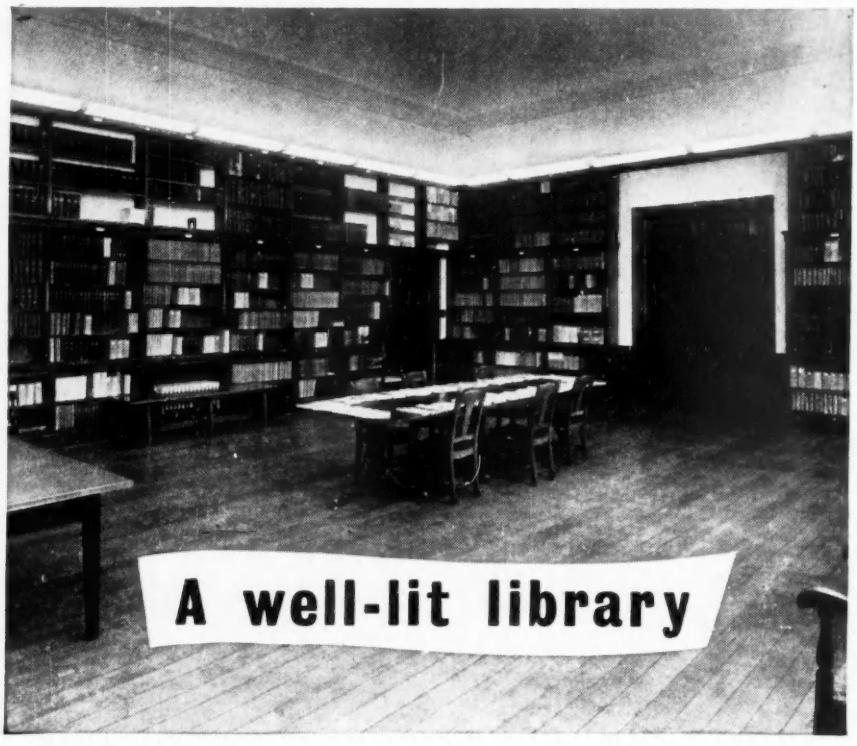

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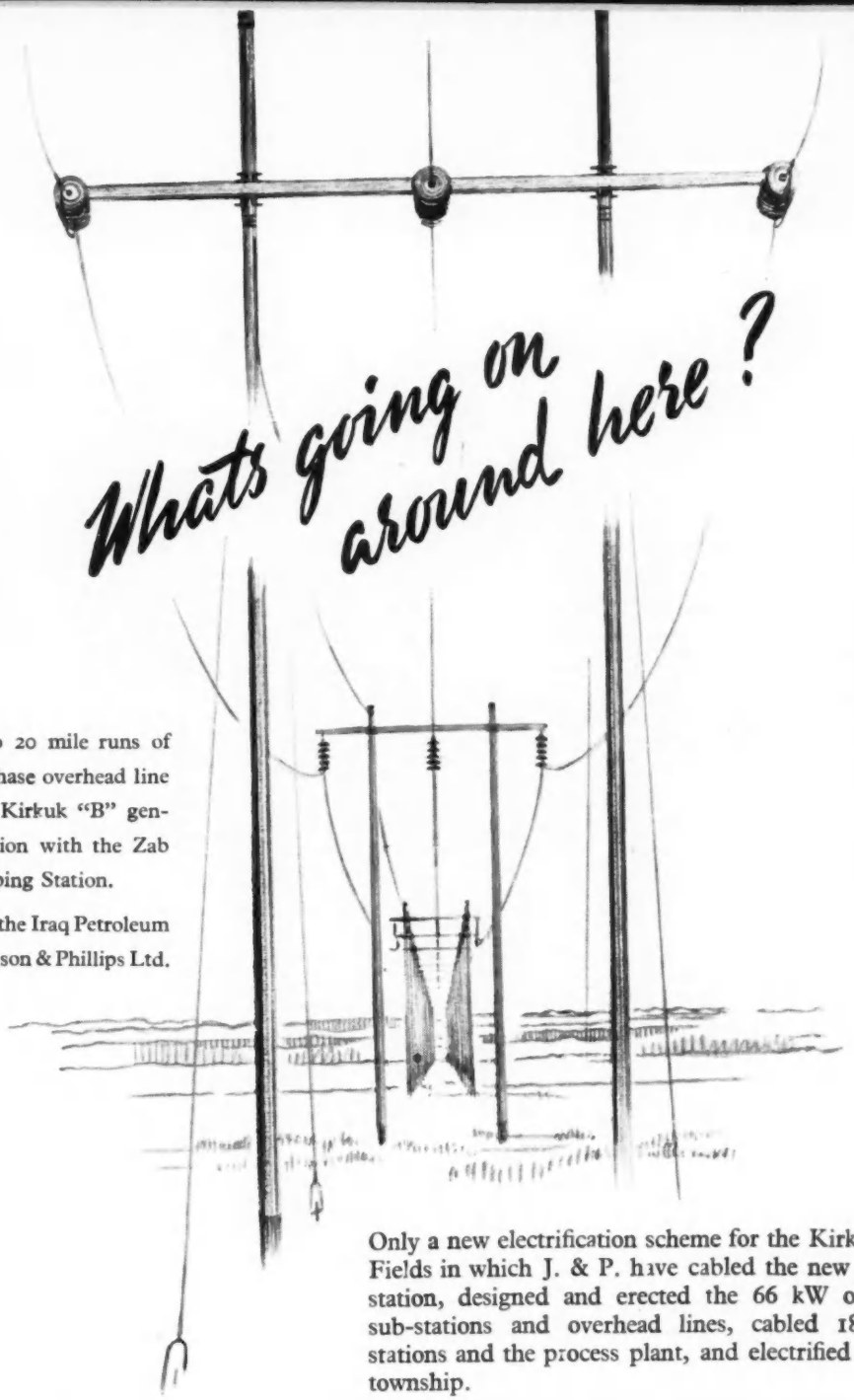

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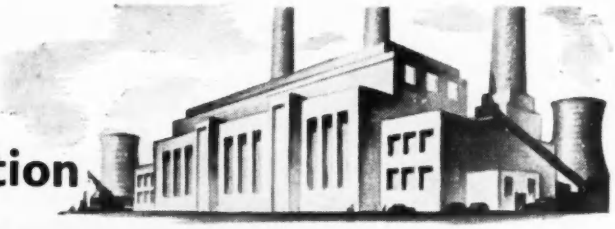
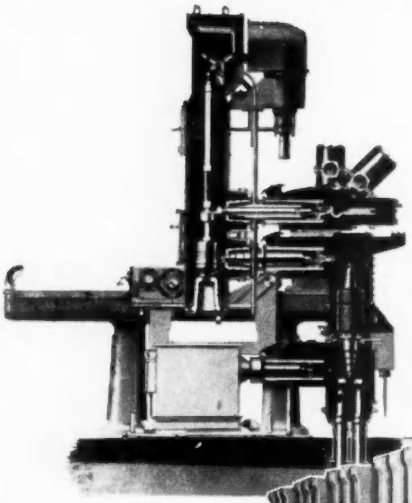


SWITCHGEAR *by*

B T-H



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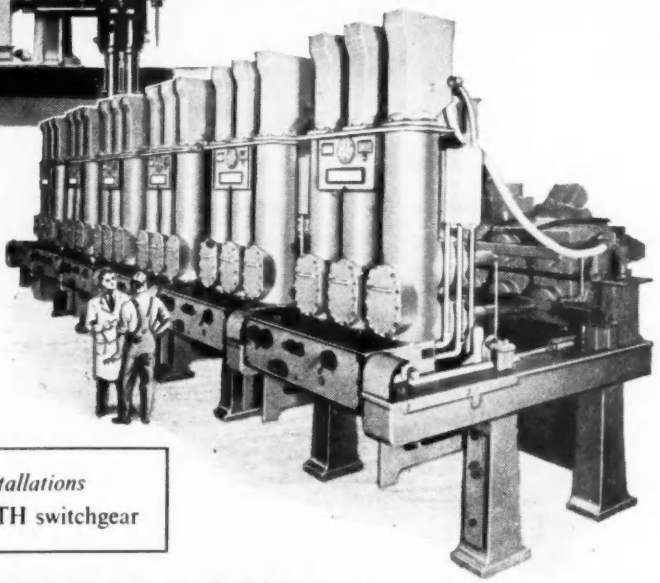

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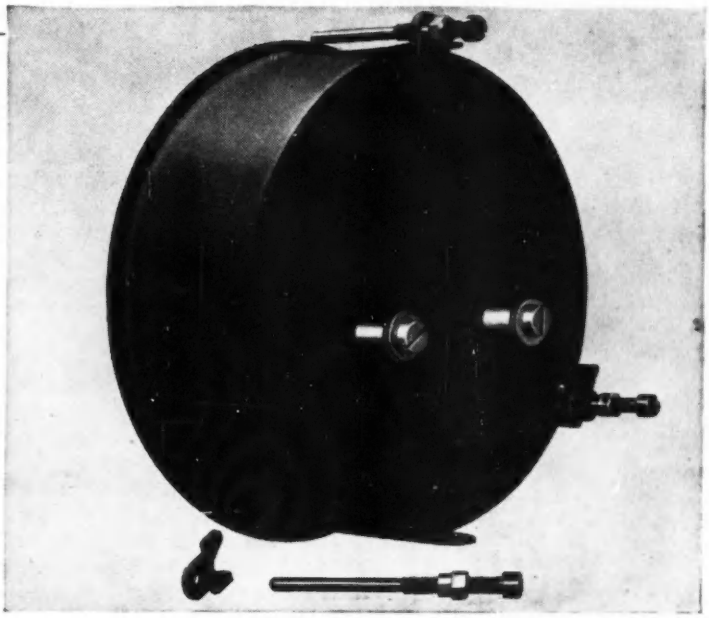

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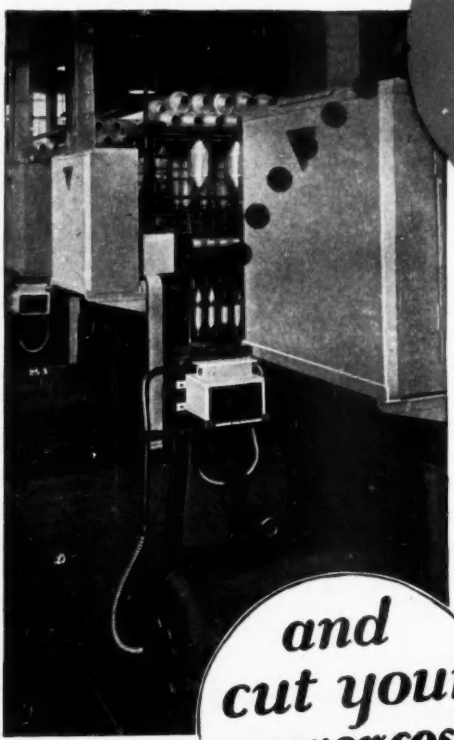

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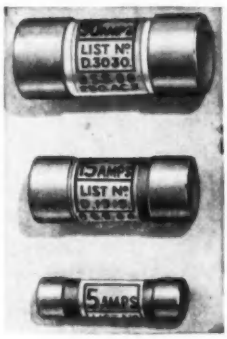

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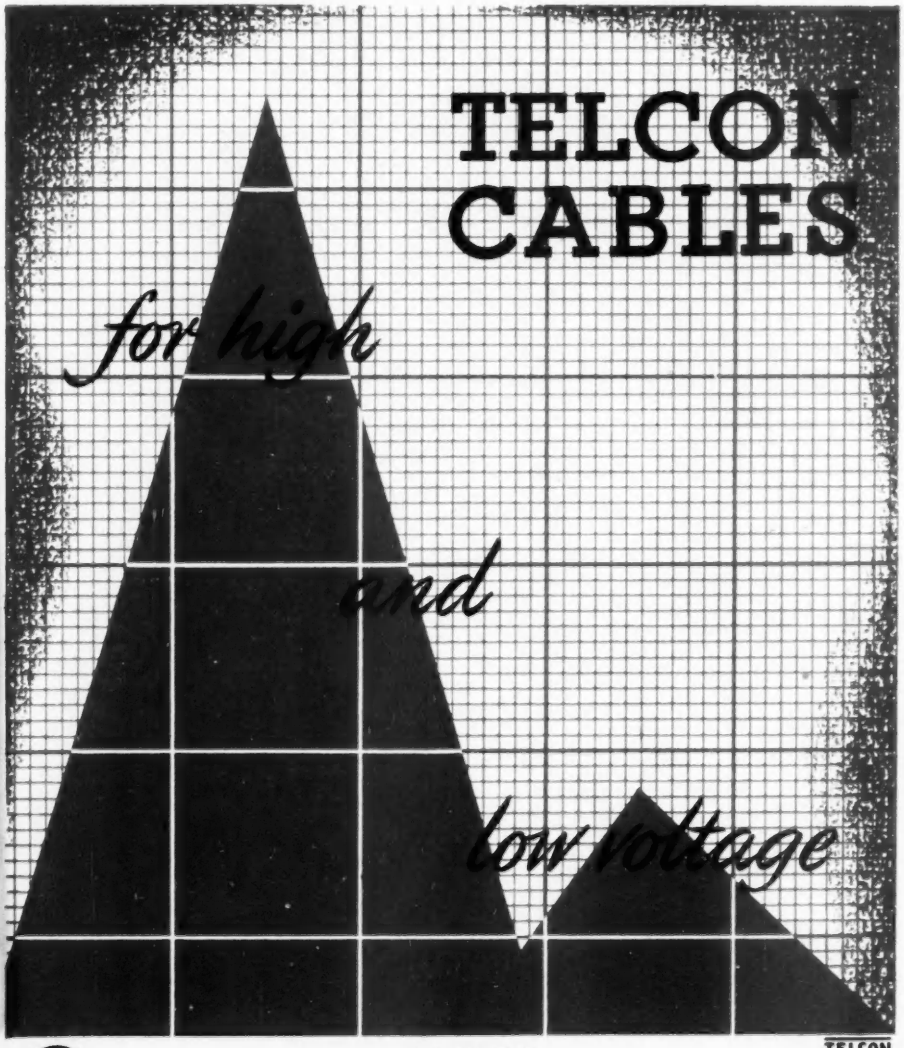

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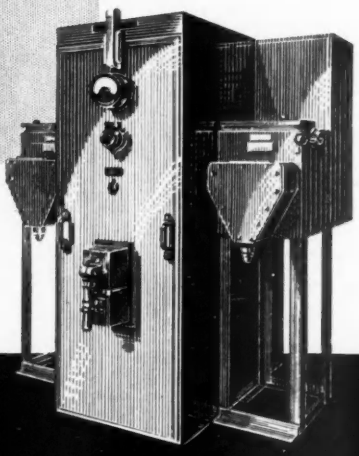

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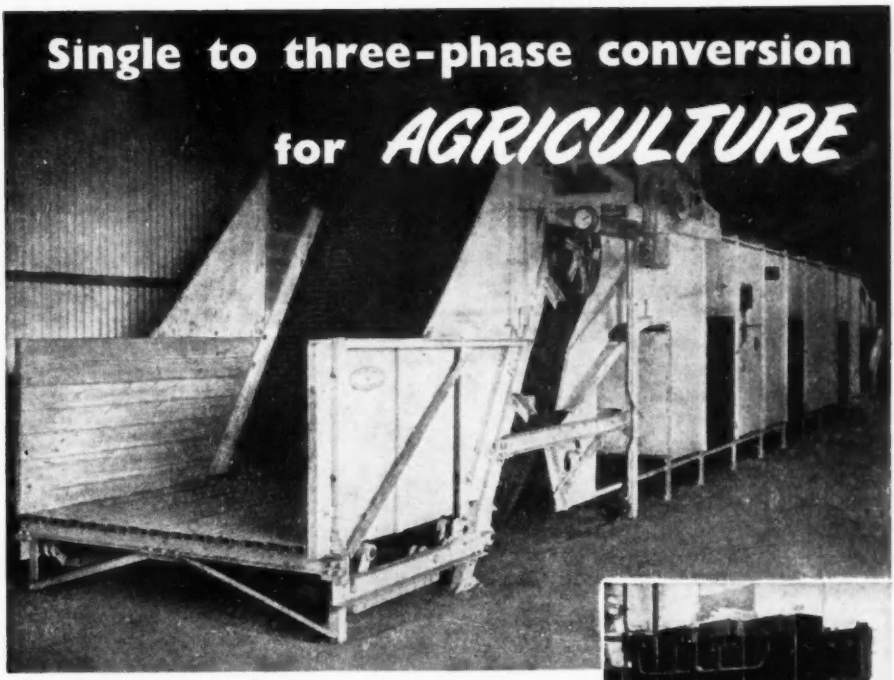

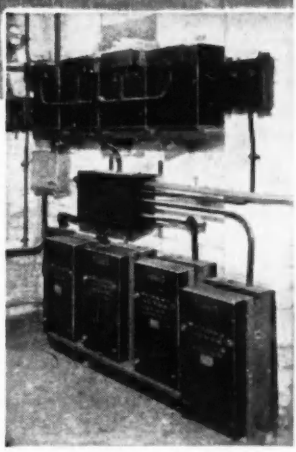

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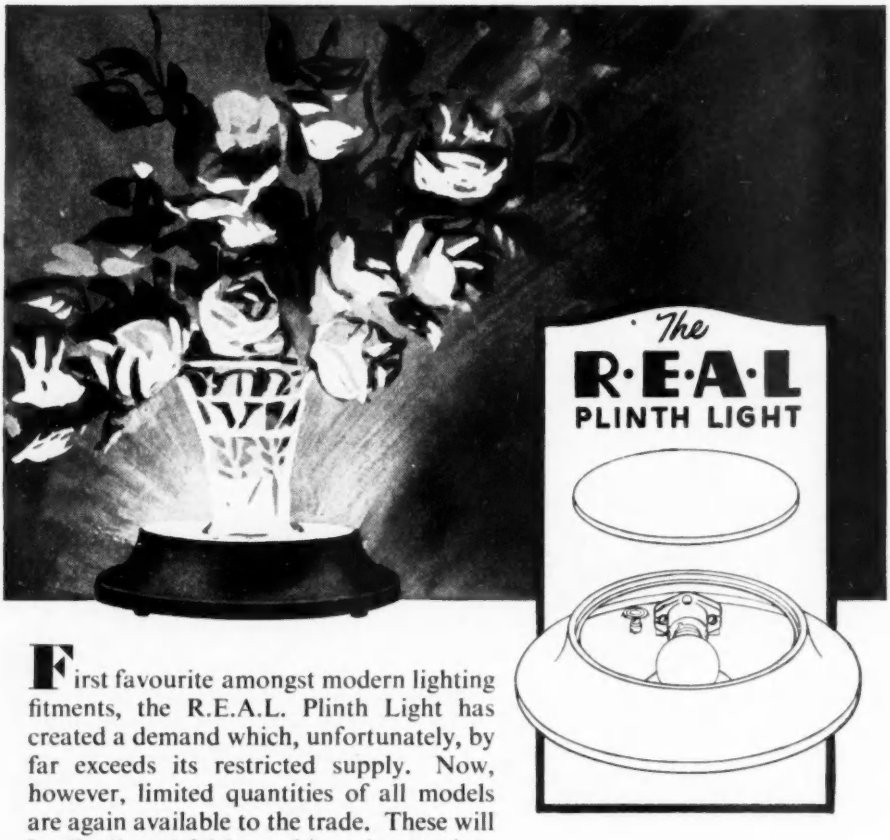

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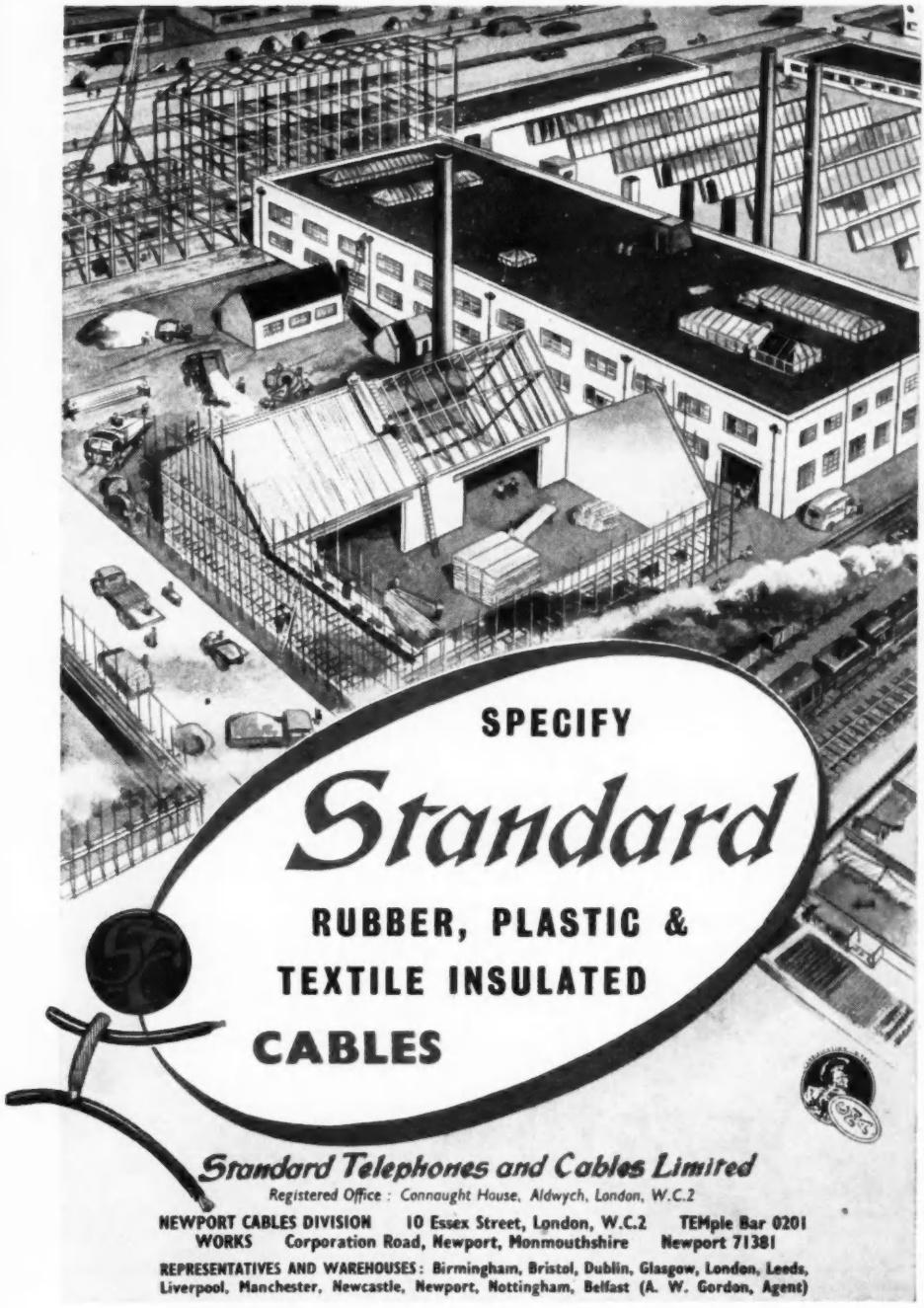
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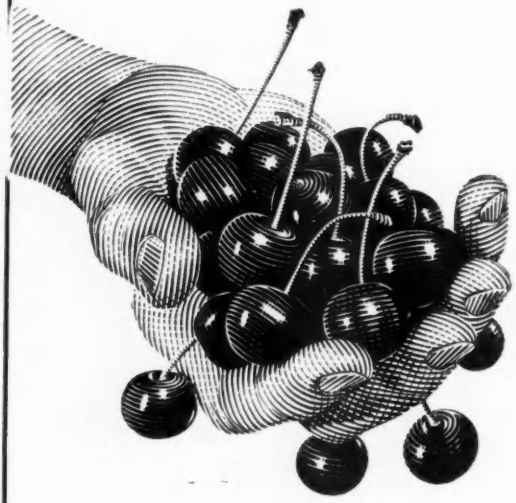

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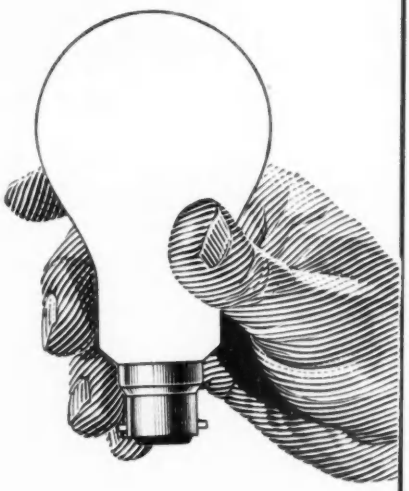

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ELECTRICAL TIMES

Vol. 120 No. 3133 THURSDAY, 22 NOVEMBER, 1951

PUBLISHED EVERY THURSDAY

SIXTY-FIRST YEAR OF PUBLICATION

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Editorial

E.L.M.A. ON TRIAL

NO trade association has been more in the public eye than E.L.M.A.: no association has been more subject to accusations of malpractices and of exploiting its monopoly position. All such complaints are examined in the 200-page report of the Monopolies Commission, published last week, and on nearly all of them it is recorded that there is no supporting evidence. On the question of lamp prices also, it is found that although pre-war, these were high compared with manufacturing costs, at the present time they are no more than moderate; indeed E.L.M.A.'s evidence was accepted that apart from the U.S.A. British prices are the lowest in the world. Wholesale and retail discounts, although their range is wide, are considered on average reasonable. Thus on the evidence put forward, the system operated at present by E.L.M.A. is found free from the objectional results that have so often been alleged by the misinformed. Indeed, the Commission clearly states that they see no reason why E.L.M.A. should be completely broken up. Nevertheless, in the broad issue of policy it is found that E.L.M.A. so conduct their affairs as to restrict competition in the supply of filament lamps and certain changes in trading practice are recommended.

EFFECT ON THE LAMP TRADE

THE question of widest significance that arises from the Monopolies Report is not the effect on the lamp manufacturers themselves, but how it will influence the lamp trade in the future. As an indication, it is useful to consider events subsequent to the publication of the two previous reports of the Monopolies Commission. In one case where the association concerned brought its trading policy into line with the recommendations, so far no action has been taken, but in the other instance a definite Order was made under the Monopolies Act, enforcing the requirements. It seems clear, therefore, that by one method or the other (and we sincerely hope and believe it will be the former) the lamp trade will be presented in the near future with an entirely new trading policy. This will undoubtedly be of simpler structure than formerly without exclusive agreements or quantity discounts; payments to associations of distributors will be terminated; and "dividends" by distributors other than the co-operating societies will be permitted. On the question of resale price maintenance the Commission had no fault to find other than recommending that collective sanctions of fines and the stop list should be brought to an end, but it added the disclaimer that no account had been taken of the recent White Paper on this subject. Therefore, until a Government announcement is made on retail price maintenance, it seems unlikely there will be any radical change in price policy. Meteor feels, however, that there must be some levelling of discounts and in consequence some distributors may have to reconcile themselves to terms less advantageous than heretofore. In the main, however, the basic trading structure is unlikely to be affected beyond the points mentioned.

SHORTER AND SIMPLER

WIREMEN who have wrestled with the problem of interpreting the full editions of the I.E.E. Regulations for the Electrical Equipment of Buildings, have repeatedly asked for something simpler. In the "Abridged Wiring Regulations," now issued by the Institution, they have the official response to their plea. These new rules are obviously shorter, but since the wording of the retained sections closely follows that of the parent code, the question of simplicity is more open. To Meteor, however, it seems that the meaning of the rules

is more apparent, and the draftsman of the parent code is thus vindicated against charges of unnecessary obscurity. Rightly, the technique adopted by the Wiring Regulations Committee from the beginning has been to obtain brevity by catering for the electrician engaged in house wiring, and then only with reference to his work on site. The omissions resulting from this policy have an effect far beyond a mere shortening of the text : they reduce the interference of the necessary qualifying clauses and so make the Regulations altogether easier to follow.

ALL OUT FOR SAFETY

THAT many silly and careless things are done with electric circuits and appliances installed in people's homes is common experience. Yet serious accidents are so rare as to be certain to appear in newspapers, a state of affairs which demonstrates that electricity is essentially safe to use. And it could easily be kept safer. Consumers need only a little more knowledge, and if the E.D.A. campaign described elsewhere in this issue succeeds, such a desirable improvement will be brought about. Tell the customer what points to watch is the basis of this "electricity is safe, let's make it safer" drive. E.D.A. has chosen as the channel for this message those members of the industry who come directly into contact with consumers. Meter readers, service centre staff, demonstrators and private contractors, all are being given the opportunity to increase still further the reputation of electric power as a safe and handy servant. The effort, if made, will lead to fewer accidents and fewer fires; that, surely, makes it worth while.

INTERMEDIATE DEGREES

THERE is a remarkable suggestion for modification of the British system of engineering education in the recently published Productivity Report on Universities and Industry. The idea developed is that engineering in the United States benefits from the large number of graduate recruits it obtains, but that these men, so far as they hold Bachelor's degrees, are educated to a lower standard (by about one year) than their British nominal equivalents. Their availability, however, has a strong effect on the speedy translation of research ideas into production realities, and the controversial suggestion is made that steps should be taken to bring about a like position in this country. Education to a technical standard perhaps lower than that of Higher National Certificate is envisaged, but the general educational background should be broader, and the qualification awarded should be obtained through whole-time study. Certainly, there was no suggestion like this in the recent Government White Paper on Higher Technological Education. In view of these recommendations, however, both industrialists and educationalists might well carefully consider the matter again, to see if some modification along the suggested lines might indeed benefit this country.

DEMONSTRATORS' GRADE

IT is more than a year since we published a summary of the agreement on salary scales for commercial staffs which N.A.L.G.O. negotiated. With its negotiation, many housecraft advisers and demonstrators felt that they had at last arrived somewhere. Prior to nationalisation, conditions of employment and salaries had varied very considerably between different undertakings, and there is little doubt that the less fortunate demonstrators were poorly paid. To them the agreement proved some advantage. Amongst what might be called the middle and upper classes, however, there is considerable disappointment with the results achieved. Grade 2 was allocated to senior demonstrators and housecraft advisers, the qualifications being defined as "responsibility for demonstrations and supervision of demonstrators." The expected staff expansion has not happened in many instances, so that there are many qualified women in the industry who find themselves assessed in the lowest grade. They surely deserve something better than that.

Meteor

Windsor, Ontario, goes on Load

SECOND CANADIAN STATION WITH BRITISH PLANT IN COMMISSION

THE first of the four 60 MW turbo-alternators ordered from the English Electric Co. by the Hydro-Electric Power Commission of Ontario, was running when the J. Keith Clarke station was formally opened last Friday. This station is located at Windsor, Ontario, on the north bank of the Clair River, opposite Detroit and is at the centre of a heavy load area.

Negotiations for the building of the plant began in 1947 and orders were placed for the first two units in 1948. Subsequently two further sets were ordered from the same manufacturers and, when completed in 1953, Windsor will be the second largest steam-driven station in Canada, the first being the Richard L. Hearn station, described in the ELECTRICAL TIMES of November 8.

General Plant Description

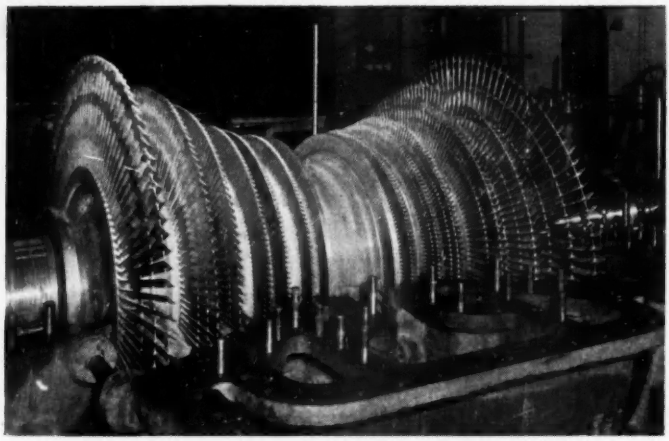
The frequency of the Canadian system being 60 c/s, the machines correspondingly run at 3,600 r.p.m. Steam operating conditions are nominally 850 lb/sq in., 900° F, although the sets can accept maximum pressure and temperature of 900 lb/sq in., 915° F. At a loading of 60 MW the designed vacuum is 28½ in. Hg.

A fairly straight-forward turbine design has been adopted consisting of a two-cylinder tandem machine with an impulse-type high-pressure cylinder and a double flow reaction low-pressure cylinder.

Two steam chests are provided each carrying a throttle valve and overload valve. Special attention has been paid to the pipe system connecting the chests to the h.p. cylinder, there being two pipes for each throttle valve and one for each overload. By symmetrically disposing the chests on either side of the machine, this arrangement ensures that pipe thrusts due to expansion generally cancel out, and the turbine is relieved from pipe thrust loads.

Generous axial float is provided by the couplings between each shaft, and as the h.p. turbine has its own thrust block, which can be moved slightly in an axial direction, the effects of differential expansions during starting or unloading periods can be minimised. With the same object in view when starting, the flanges of the h.p. cylinder are provided with controllable steam heating.

The lubrication system is somewhat unusual inasmuch as four auxiliary oil pumps are provided. One of these is the normal steam-driven full duty auxiliary oil pump, and the second is an a.c. motor-driven unit. The third and fourth pumps are driven by a.c. and d.c. motors and have been installed as it is proposed to uncouple the alternator and run it as a synchronous condenser should necessity arise.



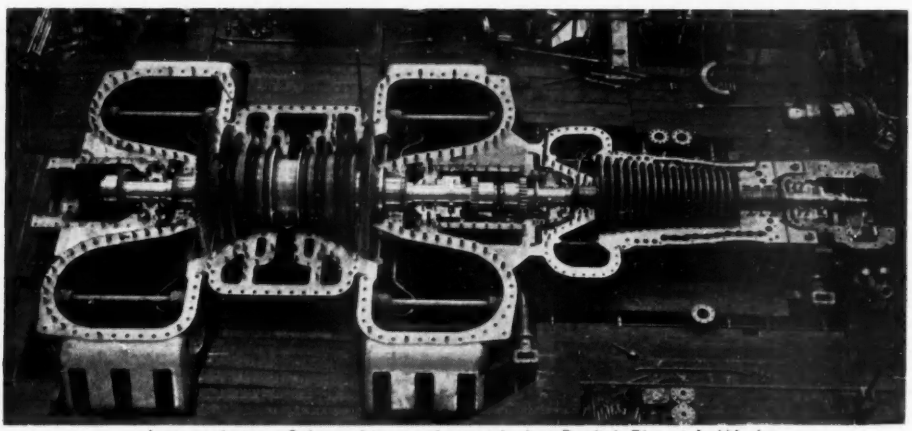
The l.p. shaft showing double-flow blading in its casing

Comprehensive turbine instrumentation, in addition to the normal gauges and meters, has been included. This comprises an electrical speed indicator driven from an induction tacho-generator coupled to the turbine shaft. In addition to giving the instantaneous speed of the machine, this also provides a written speed record. To check on shaft straightness is an eccentricity indicator and recorder, and to check the clearances between the h.p. rotor and the cylinder is a shaft position or axial differential expansion indicator and recorder. These latter instruments are of particular use during running-up and shutting down and operate on the principle of introducing the distance to be measured as a variation in an air-gap controlling the reactance of an inductive circuit. Pedestal expansion of the h.p. end is measured by the variation in parameters of a bridge circuit, using a mechanical linkage between the steam end pedestal and the pedestal base, and finally vibration indicators in the form of pick-up heads are mounted on the bearing pedestals, just below the centre line, to record and indicate all transverse vibrations.

Arrangements have been made for supplying the turbine with dry saturated steam to wash away any deposits which may have formed in the turbine. This is carried out at no load with considerably reduced speed.

The hydrogen-cooled alternator generates at 13·8 kV, 3-phase, 60 c/s, and has a rated output of 60 MW at 0·85 p.f. The stator frame is a fabricated structure, suitably ribbed and stayed internally to ensure rigidity. Separate cast steel brackets, bolted to the endplates of the frame, support the bearings. Although full precautions have been taken to prevent the formation of an explosive mixture while the machine is running, the strength of the frame is such that in the event of an explosion it will withstand the resultant pressure wave.

Supported by flexible leaf springs inside the frame is the stator core assembly to prevent any 120 c/s vibration being transmitted to the main frame and the foundations.



A general view of the turbine on the test bed at English Electric's Works

As is general practice, the hydrogen coolers are mounted within the main frame and the fans are carried on the shafts. This eliminates all external ducting and pipework carrying hydrogen and thus greatly simplifies the task of maintaining a gas-tight enclosure. Also in common with many modern sets, the excitation is derived from a slow speed generator (1,000 r.p.m.) driven through gearing from the main shaft.

When completed, the J. Keith Clarke station will have an installed capacity of 240,000 kW and will be co-ordinated into the existing generation, transmission and distribution facilities of the Southern Ontario system. It will become an integral part of the $200 million frequency conversion scheme which will see the end of the 25-cycle "island" in south-west Ontario, and, along with other developments under construction, it represents another step forward in the Commission's efforts to keep pace with the soaring power needs in the highly industrialised sections of this part of the Dominion of Canada.

EASIER WIRING REGULATIONS

I.E.E. at last issues an Abridged Version

A CONSCIOUS attempt is made in the I.E.E. Regulations for the Wiring of Buildings, to make provision for all normal circumstances that may be expected to come under such a heading. The result is a rather bulky handbook, containing much information that the wireman engaged on installations work in small houses does not require, and phrasing some of it in a way that makes interpretation dependent upon critical study. For a long while a simplified code has been promised covering such house installations, and at last it has appeared.

Before studying in detail the omissions and changes that have been made to reduce the regulations to one-third of their length, the idea on which the abridgement has been based must be stated: it is presentation of a convenient means of reference to points about the regulations which are likely to be met with on site. The force of the full wiring rules remains unimpaired, and it is upon their wording that interpretation must be based.

Omissions

As a result of this basic scheme, references which mainly interest designers have been omitted. Further, those sections of the regulations which apply to circuits of voltage above 250, or other than single-phase are also out. The fuse and e.l.c.b. are accepted as the standard circuit protection (no mention of circuit-breakers), and v.r.i., p.v.c., t.r.s. and lead-sheathed cables are the types to which reference is made. More specifically, there is no reference to m.i.c.c., varnished cambric, paper and jute insulated cables, and hard-metal-sheathed cables. Similarly, wiring on cleats and in wood casing, wiring using bare conductors and earthed concentric wiring are ignored.

For those familiar with the full 12th edition of the wiring rules, some idea of what this means in terms of the sections will be of interest. Regulations 1 to 4 (the "General" regulations) are retained unaltered. Section 1, "Control and Distribution of Supply," is cut considerably, dealing as it does largely with design features, and the same comment applies to Section 2, "Arrangement of Final Sub-Circuits," and to a lesser degree to Section 3, "Installing of Conductors and Cables (General)." Section 4, on methods of wiring, is retained in full so far as it applies to the wiring methods considered, but Section 5, "Temporary Installations," is entirely omitted.

"Installing of Accessories and Fittings," Section 6, is retained at some length, but Section 7, "Installing of Current-using Appliances," omits all reference to motors, generators and other machines, and to electrode boilers. With regard to the installing of electric discharge lamps, Section 8 (General) is retained largely unaltered, but Section 9 H.V. is dropped in its entirety. The important Sections 10, "Earthing," and 11, "Testing," are retained substantially whole, while those on private-generating plant (12) and the construction of electrical apparatus are left out. The only tables kept are those giving the rating of v.r.c. and p.v.c. cables and flexible cords, and noting suitable fuse element sizes and conduit capacities. Of the four appendices, only that covering earthing to water-pipes and water-mains is retained. The index is kept agreeably full, so that rapid reference is facilitated.

Copies of the "Abridged Regulations" may be obtained from The Institution of Electrical Engineers, Savoy Place, Victoria Embankment, London W.C.1, price 2s. 6d. each, including postage.

Our readers' views . . .

Water Heating Efficiency

THE views expressed by your correspondent, Mr. B. E. A. Vigers, are unlikely to be taken too seriously, but since he represents a school of misinformed thought rather prevalent at the present time, his statements ought not to go unchallenged.

His comparative overall efficiency figures for electricity, gas and solid fuel may be made to look correct, or they may be made to look hopelessly incorrect if a host of other considerations are taken into account.

Mr. Vigers produces no other evidence to justify his contention that electric water heaters are "of negative national value." He dismisses from his calculations the fact that they are mainly consumers of electricity at off-peak periods, and completely overlooks the fact familiar to most readers of your journal that electricity itself is largely generated by means of low-grade fuel.

He ends his letter with the sweeping statement that electric heating, presumably personal warming as distinct from water heating, is a luxury which the country cannot afford. If this theory is pursued, all domestic heating must be considered a luxury, since every form of fuel is in short supply and urgently needed for purposes other than burning in the domestic grate or boiler. However, nature has ordained that people shall keep warm. As long as this continues to be so, and in the absence of any revolutionary development, what better alternative is there throughout the year for intermittent heating and for rooms occasionally used, than the electric fire? For such purposes it is not practicable or economical to light solid fuel fires, and I do not believe the public would accept the gas alternative, even if it could do the job, which it can't.

Raymond Berry

LONDON, W.1

IN the first paragraph of his letter published in the issue of November 15, Mr. B. E. A. Vigers correctly interprets my views. As the representative of a specialist manufacturer, it is not within my province to comment upon the remainder of his letter. The inference is obvious.

A. J. Wyndham Roberts

LONDON, S.W.1

O.C.B. Troubles

WITH reference to number 9 of the series "Trouble—and Remedies," sub-heading "Oil Circuit-Breakers," surely the most common cause of over-heating of oil circuit-breakers is one not mentioned in your table. I refer to minute traces of sulphur in the oil.

In such cases of over-heating as have been brought to my notice, this has been the most frequent cause of the trouble. Its cure is, of course, to clean the contact faces and to change the oil. As a temporary measure, some alleviation of the trouble can be obtained by merely operating the breaker a few times to break down the minute film of copper sulphide on the contact faces which we are given to understand is the root of the trouble.

D. Kingsbury

SUTTON COLDFIELD

THE series of tables provided by your contributor S. Spence, B.Sc., must prove of inestimable value to the maintenance engineer who is obliged to handle such a wide diversity of plant and equipment. Article No. 9, treating with motor starters and switchgear, affords me particular interest, and there is a point I would like to bring to the attention of all users of this equipment.

My company are engaged in the manufacture of contacts. In these days of acute difficulties with regard to the supply of copper, we, in company with all other manufacturers, are finding it increasingly difficult to satisfy the urgent demands of our friends for replacement components. In order to ensure that the absolute maximum contact life can be attained, we do recommend that "contact oil" is applied. This oil has been specially developed for the purpose and since it reduces the contact resistance it does much to overcome initial arcing, with its subsequent pitting so often resulting in the final welding of the contacts.

Now, what I feel is of considerable interest is that although this medium was originally intended for heavy current duty, it is now being employed more and more in the field of light current engineering. Development engineers engaged in research on radar or television are finding that the application of "contact oil" to valve pins effects a most marked improve-

ment in stability and reduces to a minimum those problems usually associated with this type of equipment.

John M. Harding
LONDON, N.10 Assoc.I.E.E.

The Independent Highlands

MAY I comment on the paragraph in your issue of November 8 entitled "The Independent Highlands."

While you agree with the proposal that the North of Scotland Hydro-Electric Board should retain their independence, you suggest that several water-power schemes which have been launched have been uneconomic in themselves and will be subsidised from sales to the British Electricity Authority of electricity from more profitable schemes. The so-called uneconomic schemes which have been launched are not water-power schemes at all, but are electricity distribution schemes, and it is they which are financed from sales of electricity to the south. Our price arrangements with the British Electricity Authority are by mutual agreement and are based on the cost of steam production.

When you consider that five farms out of every six in the United States are connected to the mains, that more than one farm in three is connected to the mains in the rest of Great Britain, and that only one farm in ten is connected in the Board's Area, which is a great food-producing district, you will appreciate the necessity for the continued development of supplies.

G. D. Banks
NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD Information Officer

Supplies from Hayle

Cable-laying across the Estuary

HAYLE power station, located at the extreme end of the Land's End peninsula is now nearing completion, and the associated supply lines to St. Ives and Penzance have been constructed. One of these lines includes a section of about 315 yards of 33 kV cable which crosses the Hayle Estuary. The bed of this estuary is of sand and shifts from time to time according to tidal conditions and the amount of sluicing carried out. It was, therefore, necessary to "snake" the cable in the bed to ensure there would be sufficient slack to enable it to sink more deeply in the sand should the level of the bed shift considerably.

As the river is navigable at the crossing point, it was important to sink the cable as deeply as possible. Trenches, however, could not be dug in the section—which is never uncovered at low spring tides—due to the depth of water and the soft nature of the sand. The Cornwall engineers of the South Western Electricity Board hit on the idea of "blowing" a trench for the cable using high-pressure water jets and compressed air jets. These were directed on to and into the sand along the route of the cable which gradually sank, leaving no part exposed.

In the initial stages, the cable, manufactured by W. T. Glover and Co. Ltd., was hauled across the estuary at low water, utilising cable rollers along the section of the route above water level. The 315 yards of cable, weighing about nine tons, was hauled over by a power winch on a tractor and the whole operation took about one and three quarter hours and was completed in a morning.

Hauling the cable across the estuary in the early stages of the proceedings

MEASURING POWER

Effects of Instrument Transformer Errors

By D. HANSTEAD, B.Sc., A.C.G.I.

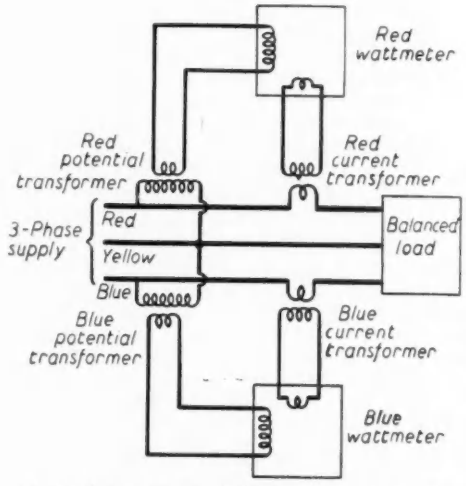


Fig. 1. Schematic circuit for power measurement

THE usual method of measuring power in a 3-phase 3-wire circuit is to connect two wattmeters as shown in Fig. 1, using two current transformers and two potential transformers. These transformers will probably have ratio and phase-angle errors, and it is assumed that these errors are known for the burdens at which the transformers are operating. The correction which must be applied to the wattmeter readings in order to allow for these errors may then be calculated for any particular power factor. The mathematics involved are, however, somewhat tedious, especially if a range of power factors is to be considered. The curves given below have therefore been calculated to enable the correction necessary to be rapidly determined.

Curve Interpretation

The following symbols will be used:

Δ_{Red} = (Phase angle error of Red current transformer).
— (Phase angle error of Red potential transformer).

Δ_{Blue} = (Phase angle error of Blue current transformer).
— (Phase angle error of Blue potential transformer).

Leading angles are taken as positive.

The method given can be applied equally well to integrating watt-hour meters, when the term "reading" must be taken to mean "advance in reading."

The two wattmeter elements are often combined in one instrument, in which case the "sum of wattmeter readings" is indicated directly.

A balanced load is assumed throughout, and lagging power factors only are considered.

Correction for Phase-Angle Errors

Curves 1a and 1b give the corrections which must be applied to the sum of wattmeter readings in order to allow for the transformer errors Δ_{Red} and Δ_{Blue}. The correction required per 10 minutes of Δ_{Red} at the power factor being considered is read from curve 1a. The actual correction required due to Δ_{Red} is then obtained by multiplying the value found by $\frac{\Delta_{Red}}{10'}$ The correction due to Δ_{Blue} is found

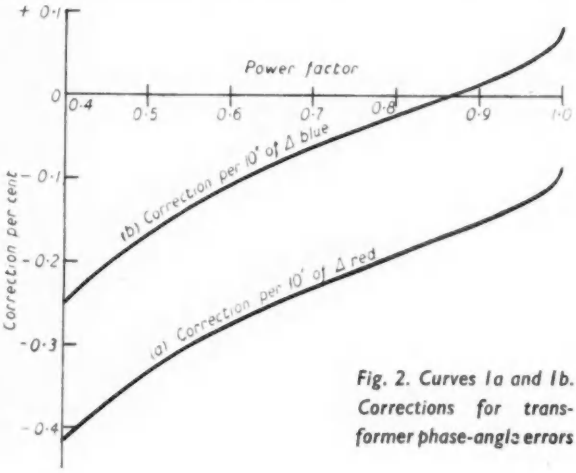


Fig. 2. Curves 1a and 1b. Corrections for transformer phase-angle errors

similarly using curve 1b. The sum of these values gives C_{Phase}, the correction which must be applied to the sum of wattmeter readings in order to compensate for phase-angle errors.

In assuming that the correction required is proportional to Δ_{Red} and Δ_{Blue} an error is introduced. This error is, however, negligible for values of Δ_{Red} and Δ_{Blue} of up to 1°. For greater values of Δ_{Red} and Δ_{Blue} the error increases more rapidly. Values for the error when Δ_{Red} and Δ_{Blue} are equal to 2° are given in the table below.

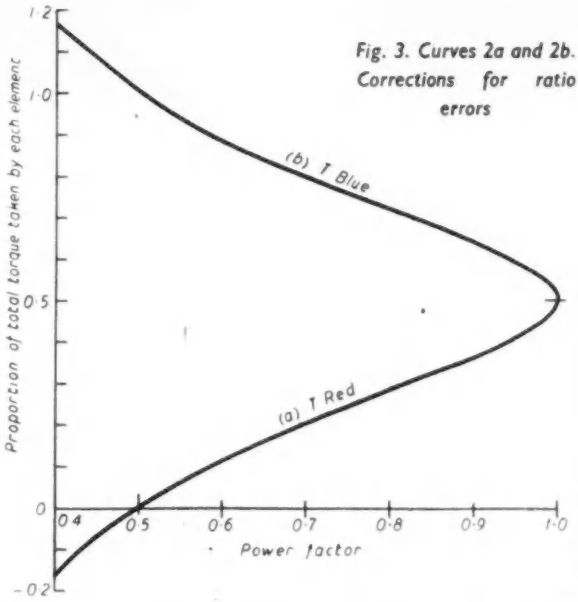


Fig. 3. Curves 2a and 2b. Corrections for ratio errors

Correction for Ratio Errors

For power factors other than unity the torques in each wattmeter element are not equal. Let E_{Red}, E_{Blue} be the sum of the potential transformer and current transformer ratio errors for the red and blue phase transformers respectively. Then the corrections required to compensate for E_{Red} and E_{Blue} must be applied to the sum of wattmeter readings in proportion to the torques in the elements. Let T_{Red}, T_{Blue} be the proportions of the total torque in the red and blue elements respectively. The values of T_{Red} and T_{Blue} for the power factor being considered can be found from curves 2(a) and (b). The correction which must be applied to the sum of the wattmeter readings is then given by:

$$C_{Ratio} = -E_{Red}T_{Red} - E_{Blue}T_{Blue}.$$

The total correction which must be applied to the sum of the wattmeter readings in order to compensate for all instrument transformer errors is therefore given by:

$$C = C_{Phase} + C_{Ratio}$$

Correction required to sum of vattmeter readings when $\Delta_{Blue} = \Delta_{Red} = 2°$.	Unity Power Factor.	0·8 Power Factor	0·5 Power Factor
(a) Rigorous solution	+0·06%	−2·48%	−5·64%
(b) Assuming correction is proportional to that required when $\Delta_{R=1} = \Delta_{Blue} = 10'$ ...	+0·001%	−2·61%	−6·03%
Error due to assumption in (b)	−0·06%	−0·13%	−0·39%

Derivation of P.F. from Wattmeter Readings

If two separate wattmeters are used the power factor of the load may be obtained from the ratio of the powers indicated by each wattmeter according to the formula:

$$\tan\varphi = \sqrt{3}\frac{1-R}{1+R}, \text{ where } \cos\varphi = \text{power factor and}$$

$$R = \frac{\text{Power in Red Wattmeter}}{\text{Power in Blue Wattmeter.}}$$

Tables are published giving the power factor for various values of R.

The wattmeter readings should first be corrected for ratio errors by subtracting E_{Red} from the red wattmeter reading and E_{Blue} from the blue wattmeter reading. If R is taken as the ratio of these corrected readings, and the corresponding power factor is found from tables or by calculation, the correction required to compensate for phase-angle errors may be found as follows: From curve 3a read the correction required per 10′ of Δ_{Red} at the value of R found. The actual correction required due to Δ_{Red} is then found by multiplying this value by $\frac{\Delta_{Red}}{10'}$. Similarly find the correction due to Δ_{Blue} using curve 3b. The sum of these corrections, when added to the power factor already found expressed as a percentage, gives the true power factor of the load.

Equation of Curves

The equations from which the curves are plotted are as follows:

Curve 1a. Correction to sum of wattmeter readings

$$= -100\,\frac{0{\cdot}577+\tan\varphi}{688+\tan\varphi}\ \%$$

per 10′ of $\triangle_{\text{Red}}$.

Curve 1b. Correction to sum of wattmeter readings

$$= 100\,\frac{0{\cdot}577-\tan\varphi}{688+\tan\varphi}\ \%$$ per 10′ of $\triangle_{\text{Blue}}$.

Curve 2a. $T_{\text{Red}} = \dfrac{\sqrt{3}-\tan\varphi}{2\sqrt{3}}$.

Curve 2b. $T_{\text{Blue}} = \dfrac{\sqrt{3}+\tan\varphi}{2\sqrt{3}}$

Curve 3a. Correction to power factor due to $\triangle_{\text{Red}}$

$$= -0.126\,\frac{(2-R)(1-R)}{(1-R+R^2)^{3/2}}\ \%$$

per 10′ of $\triangle_{\text{Red}}$.

Curve 3b. Correction to power factor due to $\triangle_{\text{Blue}}$

$$= 0{\cdot}126\,\frac{R(1-R)(1-2R)}{(1-R+R^2)^{3/2}}\ \%$$ per 10′ of $\triangle_{\text{Blue}}$.

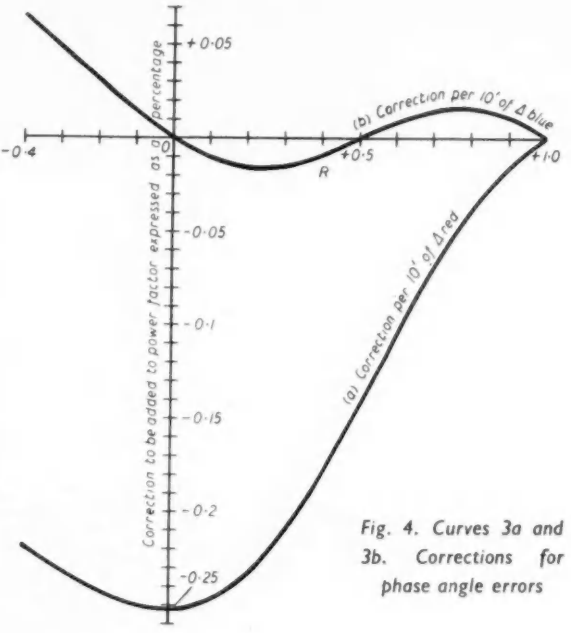


Fig. 4. Curves 3a and 3b. Corrections for phase angle errors

GLASGOW TRANSPORT PROPOSALS

AN all-embracing scheme for the reorganisation and integration of the Glasgow and Clyde Valley transport system is contained in the Report issued last Friday of the Inglis Committee. This contains *inter alia* a proposal for electrification of the suburban railway system and extensive re-building of railway stations. The railway electrification is planned to take place in three main initial stages.

These stages progressively cover the whole of the existing local railway system. An estimate of the cost of electrification, which will be on the 1,500 V d.c. overhead system gives a total outlay of £14,026,000 for the first two stages. Deductions amounting to £3,793,460 are made under the general heading of "expired life value of assets displaced" leaving a total of £10,236,540 to be raised. At 4% this will require an outlay of £409,302 per year interest. As against the capital outlay the Committee estimate an increased revenue of £958,000 (132·6%) from increased traffic. The estimated coal saving is computed to be about 70,000 tons per annum.

Other proposals contained in the report are the gradual replacement of all tramways throughout the city by trolley-buses or motor buses. All tramways outside the city boundary are to be removed and the corporation services discontinued and replaced by services provided by the Scottish Bus Group. A vehicular and passenger tunnel under the Clyde is to be constructed and possibly an additional high or low level bridge may be required.

It is pointed out that the main purpose of the scheme is to utilise the under-employed railways to the full by making them more attractive, and at the same time to relieve the congestion on the over-employed roads and streets.

Some idea of the fall in railway passenger traffic is given in the report. Figures derived from the former Caledonian Railway and relating to the Glasgow district show that, in 1913, this section carried 86% more passengers than in the year 1949. Fare anomalies are also the subject of comment.

Speaking on the Report, Sir Robert Inglis emphasised that it was "nothing heroic, nothing sensational, but eminently practical."

Sir Ian Bolton, for the British Transport Commission, said that the Commission would not be in a position to judge how rapidly the work could be undertaken until such time as the views of local authorities and development boards had been received and studied.

Fuel Research 1946-49

Progress on Problems of Efficient Combustion

SOMEWHAT belatedly, the Report of the Fuel Research Board for the period April 1, 1946, to March 31, 1949, has just been published and is available from His Majesty's Stationery Office, price 3s. This, however, represents the last of the reports covering several years, and in the future an annual report will be issued.

Owing to the delay in publication, the material contained in the report has mainly been covered by interim statements, most of which have already been summarised in the ELECTRICAL TIMES. For the sake of completeness, however, a brief digest of the report is given below.

Much of the work described is naturally concerned with the more efficient use of available supplies of fuel. This work is to a large extent due to the falling off in output and also to a change in the broad characteristics of the fuel mined. For example, the percentage outputs of anthracites, low-volatile steam coals and coking coals is falling, while the percentage output of high-volatile very weakly-caking and non-caking coal is on the increase. Carbonisation and gasification problems together with more efficient extraction of by-products are dealt with at some length.

Boiler Efficiency

Of more interest to the power station engineer, however, is the work described on raising the efficiency of boilers and steam-raising plant. The use of smoke eliminators and control of the excess air can lead to considerable improvement in boiler efficiencies.

Allied to the correct combustion of fuel is the problem of dust and grit emission, and of deposits on boiler surfaces. In this connection co-operative experiments have been carried out with the active help of the B.E.A. at many power stations. These have emphasised the comparative immunity from deposit troubles of the pulverised fuel plant, and it is stated that there is an urgent need for sending the different types of fuel to those stations fitted to burn them.

Investigations into the various methods of removing sulphur from the flue gases are described, although, due to capital cost, many of the efficient methods are inadmissible.

The building of combustion chambers both of the "vortex" and "straight-through" types, for utilising pulverised coal for gas-turbine work, is progressing.

Both the Egerton Committee and the Simon Council recommended improved heating standards, and suggested the use of solid fuel burned in high-efficiency appliances. The testing of such appliances is, however, a matter of considerable difficulty, requiring a well-equipped testing installation. The Calorimeter Building at the Fuel Research Station was therefore built to provide the more comprehensive facilities required for these investigations. The main difficulty in this type of investigation is the measurement of radiant heat, and for this purpose a special Moll thermopile has been developed covering the frequency of the radiation. This is now available from the Cambridge Instrument Company.

During the period under review, 32 grates and stoves were tested under the Ministry of Fuel and Power's scheme, and, in addition, 21 other open fires, stoves, convection devices, boilers, and so on, many of which were of foreign origin.

Atmospheric Pollution

Only a short account of the work done on atmospheric pollution has been included in this report, as the detailed information is being published in the Reports on Investigation of Atmospheric Pollution.

Advice has been given to local authorities in the Thames-side area on measurements of dust from cement works and the research station has also co-operated in tests to find the effect on local atmospheric pollution of increasing the chimney height of Bradford power station.

Sulphur dioxide surveys were carried out in several areas, including Kingston, Croydon, East London, and Staythorpe. These are to provide base-line data on the distribution of SO_2, so that the effects of the new power stations (now commissioned or coming into operation) may be assessed.

The report concludes with an account of extra-mural investigations, which includes the work being done by the British Coal Utilisation Research Association on a cyclone burner for gas-turbines. This uses fine, but not pulverised, coal, and combustion takes place partly in suspension and partly on the slag-coated walls of the furnace.

Engineers and Administrators

American Ideas and Methods for their Education

THREE recent reports of the Anglo-American Council on Productivity differ from most of their forerunners in having application to the whole field of technology, rather than to some single trade or technique. Two of them deal with education, while the third touches on that important contemporary problem, economy in scarce materials.

Most general of these reports in its application to the electrical industry is that on "Universities and Industry," which summarises the ideas of a specialist team which visited the United States in the spring of this year, under the leadership of Dr. P. Dunsheath, a Past President of the I.E.E. This team was impressed by the keen and widespread interest in college education and, in comparison with Great Britain, the more extensive provision of facilities for this type of education. A much greater proportion of boys and girls embark on a degree course in college than in Great Britain but they start their four years of study about two years behind their academic counterpart entering a British University. Many of them (about half) leave before completing a degree course. Those who do take a first degree (B.S.) have a qualification lower than a British B.Sc.; this is about equivalent to the American master's degree.

British Gap

It is considered that an important part is played in American industry by men who leave with a bachelor's degree, and these have no counterpart in Great Britain. Our graduates have been educated to a higher level, and the relatively fewer holders of Higher National Certificate are as far as, if not further, advanced in their narrow technical field as the American graduate; but they have obtained their qualifications by part-time study necessarily directed almost entirely towards that technical end.

There is nothing in the U.S. corresponding to D.S.I.R. which may explain why American universities carry out a vast amount of sponsored research for industry. If British university research is to retain its position there must be a considerable increase in available funds. Many advantages arise from academic staffs undertaking consulting work with industry.

The narrower field of Education for Management was the concern of another team which went to the United States at about the same time, Mr. L. F. Urwick (Urwick, Orr and Partners, Ltd.) being the leader. They noted that of 190 engineering schools in U.S. universities, 80 offer degrees in administrative engineering or industrial management. Other engineering schools form part of universities which have business schools where engineering students may take courses. There are now 157 such schools, and they recruit their staff largely by invitation to men who have built up successful business careers. Such men commonly take part in business as consultants or hold directorships in public corporations, a procedure which is believed to be conducive to successful teaching, and which secures the necessary adequate remuneration.

Business Courses

The aim of business courses generally is to teach students to work with people at all levels, to give them an appreciation of the social purpose of industry and of the relationships of industries to one another and to the community, and to develop the qualities of character necessary for the practice of administration. Practical experience has a well-appreciated place in the various courses. Practising high-level business executives are offered advanced training programmes to help them overcome the difficulties of specialisation.

In its conclusions, the team stresses its belief that productivity and training for management are closely related. The subject, they say, is of such vital importance that British industry as a whole should study means for promoting educational experiments in this field.

Scarce Materials

Finally in the trio of reports to be reviewed comes that entitled "Saving Scarce Materials." This is not intended to be a comprehensive and detailed guide to what is being done in the United States, but rather as a short study of economy in the use of metals in the engineering and allied industries. Detailed reference is made to measures possible in the case of a number of metals which are in short supply, while some uses of plastics in the electrical industry are also noted.

The three reports, price 2s. 6d., 4s. 6d. and 2s. respectively, are obtainable from the Anglo-American Council on Productivity, 21 Tothill Street, London S.W.1.

Vapour Cooling of Transformers

New Technique presages Lighter Units

By H. W. PERRY

WEIGHT of some future electric transformers may be made 25 to 33⅓% lighter than conventional oil-immersed or air-cooled transformers by the application of a novel cooling method devised by Dr. C. F. Hill, manager of the insulation department of the Westinghouse Electric Corporation research laboratories. The method is being developed jointly by the Company's laboratories and the transformer division, which is designing a unit for service test use by the Consolidated Edison Company, supplier of power and light current in New York City.

This new cooling method is said to be the first basic change in transformer cooling technique since the ideas contributed by George Westinghouse more than 60 years ago. Heat generated by the operation of a transformer limits to a considerable extent the amount of power it can handle. More effective cooling of the core and coils can, therefore, increase the capacity and permit a large weight reduction of transformers of a given electrical rating and performance compared with the conventional liquid-immersed units.

The new technique consists in spraying the core and coils with liquid fluorocarbons. These belong to a new family of synthetic compounds of high molecular weight and are described as characterised by a suitable boiling point and heat of vaporisation, and high dielectric, and impulse strength at low pressures. The 60c/s dielectric strength in a reasonably uniform field at atmospheric pressure exceeds that of transformer oil.

Fig. 1 illustrates the system diagrammatically. Liquid fluorocarbon is forced by a small pump (A) from a sump to a nozzle (B), which sprays it uniformly over the transformer core and coils (C). Heat of these units vaporises the liquid and is reduced by evaporation. The vapour fills space in the tank (D), insulating the transformer parts, and is forced upward through cooling tubes (E) and condenses. The condensate then flows back into the sump for recirculation.

Only a small drop in temperature occurs during condensation. The fluorocarbon remains near the boiling point throughout the system, and temperature of the cooling surfaces is only a few degrees centigrade lower than that of the coils.

Fig. 2 is reproduced from a photograph of an experimental 500kVA vaporisation-cooled transformer. It shows various test devices used for obtaining data for design purposes. The commercial unit when fully developed will bear little resemblance to it.

Experimental Transformers

Two experimental transformers have been built and operated. The first was a modified standard dry-type equipped with adequate cooler capacity. With vaporisation cooling it dissipated ten times more heat than could a conventional dry-type transformer and delivered more than two and a half times its rated capacity. The losses and impedance of this load are much too high for practical operation, but the test results showed the possibilities of the cooling method.

For the second experiment, a transformer of 500-kVA capacity, 2,400/240 V, was specially built and has been operated with vaporisation cooling since January 1, 1951. Information gained from this by September 1 is being applied in designing the network transformer to be installed in the Consolidated Edison system. Operation of the latter is expected to supply valuable service experience and also

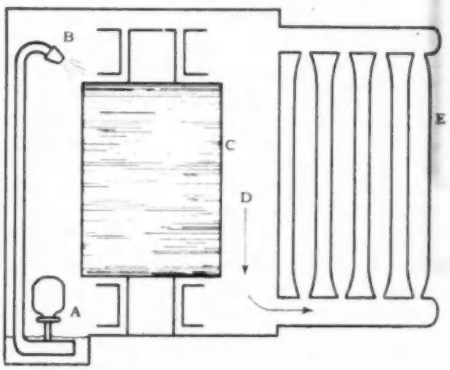


Fig. 1.—Diagram illustrating new system of transformer cooling by vaporisation of a non-inflammable, dielectric liquid

provide information for solution of a number of remaining problems.

Advantages of vaporisation cooling which already are known or indicated are as follows:

(1) Liquid fluorocarbon will not burn and has fire extinguishing properties, hence a transformer cooled with it will be as safe as or safer than dry-type or oil-immersed transformers.

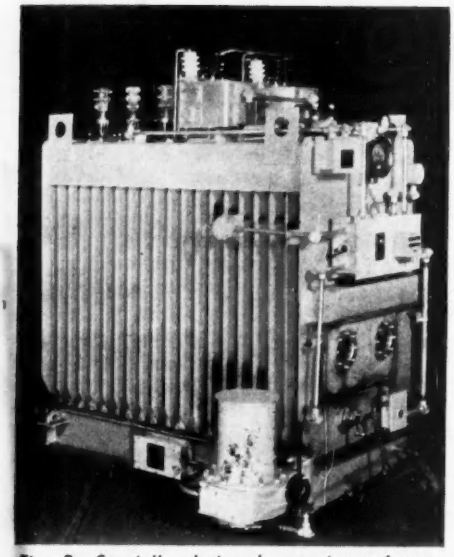


Fig. 2. Specially designed experimental transformer for operation with the new cooling method and equipped with various instruments for obtaining data while under test

(2) Because heat is transferred much better by evaporation than by convection to circulating oil or air, transformers probably can be designed with more compact coil assemblies and reduced cooling surface and without inherent limitation of size.

(3) Owing to the more rapid exchange of heat from the coils to the tank-cooling surfaces, better advantage can be taken of the temperature rise of the copper and the coolers could be located at a reasonable distance from the transformer.

(4) Superiority of the dielectric strength of fluorocarbon over common gases should enable the voltage range of transformers to be increased far beyond the present maximum 15-kV rating of the dry type.

Only a fraction as much fluorocarbon is required for cooling compared with oil for immersion. Its present high price, however, may make the cost of a vaporisation-cooled transformer actually more than that of a liquid-immersed type. But this likely cost differential is expected to be offset by the advantages where greater safety is required than is provided by liquid-immersed transformers; where the dry type cannot be used because of space limitations and voltage requirements, and where very compact installations with forced cooled external or remote radiator systems are required.

APPLICATIONS OF HIGH FREQUENCY HEATING

A GENERAL review of the potentialities and applications of high frequency heating was given by Mr. M. O'C. Horgan at a joint meeting of the Association of Supervising Electrical Engineers and the Institution of Engineers in Charge on Tuesday night.

Dealing first with induction heating, Mr. Horgan emphasised the phenomenon of "skin-effect" which was largely responsible for the selection of the frequency used, as the depth of heating became more confined as the frequency was raised. Thus for steel melting in large crucibles—one ton or more at a time—a frequency of 200-1,000 c/s would be used, rising to 3 or 5 kc/s as the crucible size was decreased to one cwt. or less. At the other end of the scale for surface hardening of small steel parts, frequencies of 500 kc/s up to 10 Mc/s were commonly used.

Dielectric heating was suited for non-conducting bodies, and frequencies of between 1 and 100 Mc/s were used with voltage gradients across the material of up to 3,000 V/cm.

The two main methods of generation were the motor-alternator and the valve oscillator. The former was used for frequencies up to about 15 kc/s and was usually driven by a synchronous machine. Owing to the highly inductive nature of the load it was usual on big installations to fit power-factor correction condensers on the secondary circuit. The valve generator was used over the frequency range of 100 kc/s to 100 Mc/s, and valve oscillators in production had outputs of 500 W up to about 200 kW, the r.f. power being supplied at voltages from a few hundreds up to 10 or 12 thousand. Both types of generator were used for induction heating although the valve oscillator because of its high frequency output was almost exclusively used for dielectric heating.

After summing up the advantages of high frequency heating, the author dealt with some of the numerous applications which occurred in various fields. These covered surface hardening, soldering and brazing, melting and vacuum work for induction heating; and plastics, wood, furniture, rubber and foundry cores (using resin binders) for dielectric heating.

THE LAMP INQUIRY

Fuller Details of the Commission's Findings on E.L.M.A.

ALTHOUGH at first sight the recommendations in the Report on the Supply of Electric Lamps presented by the Monopolies and Restrictive Practices Commission appear to present the Electric Lamp Manufacturers' Association in a rather bad light, a closer examination of the body of the Report indicates that many of the objections raised and allegations made were in fact unsubstantiated. Some of the important points are dealt with below.

History

E.L.M.A. developed in 1933 out of the Electric Lamp Manufacturers' Association of Great Britain Ltd., and were joined by the British Philips Co. and Stella, subsidiaries of Philips, Holland. In the years since its formation it has laid increasing emphasis on standards and quality of production, and entered into a series of arrangements with distributors' associations designed to encourage them to co-operate in its arrangements for regulating distribution. In all these developments the lead has been taken by G.E.C. and the A.E.I. Group acting in close co-operation.

At that time, cheap lamps from Japan and independent British manufacturers were available, and E.L.M.A. countered these by producing a "Type B" lamp of lower quality. At the beginning of the war there were two (or possibly three) distinct prices for lamps, although now the range of prices has tended to become less. Today the main companies outside E.L.M.A. are Thorn and Ekco-Ensign. During the war a Maximum Prices Order was imposed on certain types of filament lamps, but discharge lamps have not at any time been subject to price control, and since July, 1949, there has been no statutory control of the prices of filament lamps.

On the work of E.L.M.A., the Report points out that apart from the selling system, it covers problems of lamp design and standardisation, technical and production problems arising from the requirements of large buyers, the exchange of technical and marketing experience between members, and relations with other industries, particularly with associations of distributors and fittings makers, and with Government departments, scientific and technical bodies and the electrical industry generally.

From very early days the main British lamp manufacturers have "pooled" their patents, granting each other permission to use each other's patents and as a general rule denying their use to manufacturers who are not members of E.L.M.A., although there is no single comprehensive agreement about patents, nor does E.L.M.A. itself deal with patent policy. In recent years most of these patents are connected with fluorescent lamps, and allegations have been made that the great majority had little or no intrinsic worth, but were designed to intimidate the smaller independent manufacturer. An examination of the fluorescent patent files of G.E.C. and B.T.H. showed this allegation to be false.

On the question of existing patents, a new policy was devised in recent years following the legislative changes in the Patents Act, 1949, and the Monopolies and Restrictive Practices (Inquiry and Control) Act, 1948. The principle of "pooling" is retained, but E.L.M.A. members have decided to grant licences at reasonable royalties to "all competent lamp manufacturers," subject only to the condition of price maintenance of the patented article.

Quality of Lamps

One of the early standards laid down prior to 1925 was a life of 1,000 hours. The then organisation (known as Phoebus) developed a scheme for penalising excessive or short life, and after 1929 there were fines for a life in excess of 1,500 hours and on a lower scale for a life shorter than 800 hours, unless the manufacturer had given notice that he had economic justification for making the life shorter. The luminous efficiency was maintained by a B.S.I. specification. At the present time, except for "Type B" lamps, there are no fines for long-life lamps, and the specifications to which all E.L.M.A. members work contain minima but in no case maxima for life and luminous efficiency. In fact, although the system of fines for long-life "Type B" lamps is nominally still in force, no fines have actually been imposed.

All E.L.M.A. members make lamps to B.S.I. specifications where these exist, and are represented on the B.S.I. committees concerned. It has been alleged that the frequent revision of these specifications has been made at the instance of E.L.M.A. members to discourage

competition. In fact, however, no evidence has been found that the effect of revisions has been to raise the cost of lamps or that competitors have been unable to keep pace.

Certain subsidiary companies—the "controlled companies"—are stated by E.L.M.A. to make a lower quality lamp than the E.L.M.A. members. The evidence taken, however, shows that these controlled companies supply considerable numbers of lamps as complying with the B.S.I. specification and that these lamps are of satisfactory quality.

Components

Many of the components used in lamp manufacture are available in quantity only from E.L.M.A. members or abroad, and independent manufacturers depend very largely on E.L.M.A. members for their supplies. An allegation that E.L.M.A. members made the supply of one component conditional upon the purchase of another to prevent the establishment of independent sources of supply was found on investigation to be false. In addition to this allegation was one stating that E.L.M.A. had "persuaded the glass industry to keep out of the manufacture of electric lamp bulbs and glass tubing for other manufacturers." Both E.L.M.A. and those of its members who make glass have denied this statement, and no direct evidence has been found to support it. The Commission notes, however, that the C.W.S., who proposed laying down plant for the manufacture of glass tubes for fluorescent lamps, were approached by G.E.C. and B.T.H. to dissuade them, and that the E.L.M.A. members offered to meet C.W.S. requirements on very favourable terms. As regards the tubing and rod used to make some of the internal parts of both filament and fluorescent lamps, there was no evidence seen which indicated that any approach had been made to any general glass-maker by any independent manufacturer of lamps.

Selling

The sale of E.L.M.A. lamps is regulated by an elaborate system of rules, with basic discounts to wholesalers and retailers with or without exclusive agreements. The retail price is fixed by the Council of E.L.M.A., and there is an obligation on the seller at each stage to observe the price fixed for that stage. Eighteen forms of standard agreement cover the various classes of distributors and "users" in the United Kingdom according to the groups of lamp which they purchase.

Penalties which may be imposed in cases of breach of E.L.M.A.'s provisions are laid down in the rules, agreements and bye-laws: distributors may be fined or may suffer other penalty, monetary or otherwise, inflicted by the Fines Committee, or may have their name included in a Stop List; members are liable to a maximum fine of £1,000. During the years 1937 and 1949 the total fines amounted to £2,567, of which the maximum fine was £750 imposed on a member. All fines are made over to benevolent funds connected with the electrical industry.

The Stop List was set up in its present form in 1933, and from 1938 to 1946 contained an average of 23 names. In 1947 the number fell to three and the current list contains one name.

The relations between distributors and E.L.M.A. are regulated by the Electrical Fair Trading Council's Policy. The Commission was informed that this Policy represents a code of ethics rather than a binding system and that the boycott which is permitted by its clauses has never been carried out. Certain associations of distributors are allowed over-riding commissions calculated as percentages of the net value of the members annual purchases.

Prices

The retail prices of all lamps fell steadily up to 1938. According, however, to E.L.M.A.'s figures, in comparison with abroad the British prices were among the highest in the world in 1939, but by 1951 were the lowest outside the United States.

Before the war, price changes were determined on the basis of "what the traffic would bear" and consequently returned the highest profit. This profit had been materially reduced by 1948. The Commission considered that as a high proportion (72%) of the profits earned in the home lamp businesses was distributed in 1938, these high rates could not be justified on the grounds that they were needed to provide for research and development in the rest of the electrical field. It was concluded that while prices charged by E.L.M.A. before the war were unduly high in relation to costs, the general level of prices in 1948 to 1950 was moderate. Despite the Commission's comments on pre-war prices, it is recorded that much of the benefit of technical progress has been passed to the public in the form of a progressive and substantial reduction in the price of lamps, and in the case of general service filament lamps this has continued over the last 12 years during which the prices of other goods were rising.

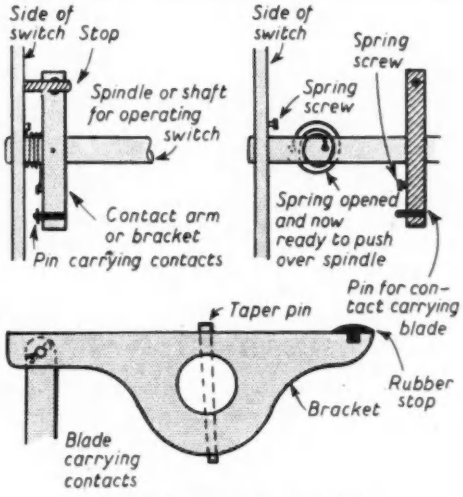
The final recommendations of the Commission were reported in our issue of November 15.

Problems and Practice

IN ENGINEERING

Spring Replacement

I AM detailing here an idea I had to replace a broken spring on a well-known make of three-phase oil break switch. I have often seen hours taken to replace these springs, by removing everything from the spindle to replace broken spring. With this method I found the spring can be replaced in about four minutes. First remove taper pin and slide bracket along

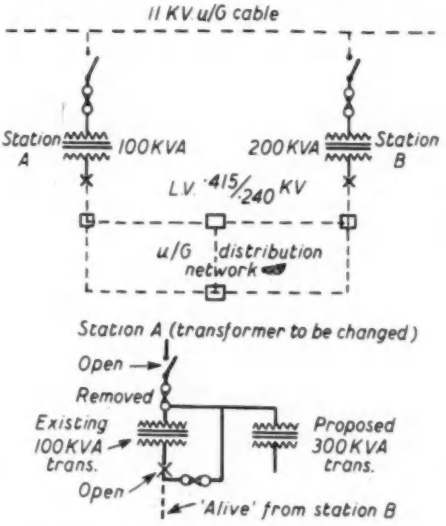


Details of c.b. spring manipulation

the spindle, take out spring holding screws and remove contact carrying blade, open spring so that you can turn it off the spindle. By the same method open new spring as in diagram, and feed it over spindle, once over, the bracket can be placed back and spring screwed to it, now use bracket as a lever until you get the hole in bracket and spindle corresponding; now the taper pin can be replaced, all is left just for the blade carrying the contacts to be replaced, the whole operation taking a few minutes. This idea may save a good deal of time where such switches are installed.—*G. A. Leighton.*

Phasing Transformers

FROM time to time it becomes necessary to change transformers at substations, due to increasing load demands. A problem then arising is the determination of the correct cable jointing for the high voltage and low voltage terminals of the transformer, and I have found the comparative method illustrated in the



Diagrams illustrating the transformer check

sketches to be convenient. Energise the high-tension windings from a 415 V supply, and phase out the low-voltage terminals of the transformers. This will prevent obtaining a high-voltage cross after the jointing has been completed, if the new transformer is crossed internally as compared with the existing unit.—*Eric Alderton.*

Gentle Slopes

IN one pneumatic suction ash handling plant which came under the writer's notice considerable trouble had been experienced due to the rapid wear of the main pipeline at one particular vertical section between the crushers and the hopper. It was suggested that the wear would be considerably reduced if the vertical section was replaced by a more gradual rise, and when this was done the results were very satisfactory. The maintenance charges on the pipeline were consequently reduced and very soon justified the additional expenditure involved. Sharp bends should also be avoided in an endeavour to reduce excessive wear. *M.I.C.E.*

SAFETY IS THE AIM

ELECTRICITY is safe to use : but with a little more care by those whom it serves, even the few accidents it does cause can be avoided. This is the message to be put over in a new campaign organised by the Electrical Development Association, which during the next few months is going all out to awaken public interest in using electricity safely and efficiently.

Outstanding feature of the campaign is to be the invitation to members of the industry to take part. Press publicity in the usual sense is not considered necessary.

To assist members of the industry in this task of publicising safety, a series of booklets have been prepared, graded in their approach to fit in with the various approaches that can be made to consumers. Spearhead of the attack is a four page leaflet suitable for handing out to users, and its title "Making Safe Safer" admirably keynotes the spirit of the campaign. Devoting most of its space to the safety factors of everyday uses of electric power, it concludes with some commonsense advice on common electrical faults, and particularly on household appliances.

A more ambitious publication is "Safe as Houses." This is a 12-page brochure which has been prepared for the consumer who wants reasons. He gets them in this production non-technically, and persuasively presented with some amusing, but pointed thumbnail sketches to ram home the moral. Subjects covered include wiring, fuses—what they are and how to deal with them, shock risk earthing and plug points. "Special hazards" for which extra precautions are suggested include the bathroom, the garage, the garden, and children.

Aids for Staff

So much for the consumer. Non-technical staff of area boards are helped by a shorter booklet, "Tell them it's Safer." This expounds some of the points made in "Safe as Houses," with the aim of enabling the intended message to be put over with authority and confidence. To this end, the industry's policy is clearly defined, and its responsibility underlined. Finally, for the further assistance of those who can employ the more formal medium of the lecture, some comprehensive lecture notes are available.

The whole scheme is sponsored by E.D.A. on behalf of the B.E.A., the area boards, and the Home Office. So that success can be ensured, co-operation is needed from manufacturers and contractors as well. Applications for information, and for the literature noted above, together with the booklet detailing the campaign, should be made to local area board offices, except for the lecture notes, which are obtainable from E.D.A. at 2 Savoy Hill, London W.C.2.

Production Reports Finalised

DELAY was occasioned in the analysis of the Board of Trade's census of production, 1948, by the difficulty firms experienced in completing in time the detailed returns required. It is with this background that it is only now, four years after the end of the year to which they refer, that detailed figures for the first two electrical sections have become available.

Preliminary figures for the two branches of the industry concerned, Electric Wires and Cables, and Electric Lighting Accessories and Fittings were published in the ELECTRICAL TIMES on November 16, and September 28, 1950 respectively. In addition to these leading statistics, however, much other interesting information is given in the full analysis. Taking wires and cables first, the variation in output with size for the 84 establishments in Great Britain employing more than 10 persons is notable. It spreads from a low value of £506 net output/person employed (4 establishments employing 500–749 people each) to £1,125 (7 establishments employing 300–399 persons). "Establishment," it should be noted applies to a works or part of a works engaged in the trade under review. Total sales in such establishments was £99,194,000 (including contracting) in 1948.

Analysis of sales for the year shows that 8·6% of production went to organisations under the same control as the works. 15·4% went to the Government and to local authorities, and 13·5% to general merchants and wholesalers, whilst manufacturers, public utilities, etc. took 41·3%. Total exports were approximately 29·2%.

Figures for the electric lighting accessories and fittings trade are perhaps less striking, the total sales of 152 establishments employing over 10 people, being £15,206,000. Net output for the 16,532 persons employed averaged £488, ranging from £421 in the 200–299 size class, up to 536 in the 11–24 division.

54·5% of total sales went to wholesalers, merchants and other agents for resale, and 14·7% to manufacturers, public utilities, etc., 8·9% was attributable to sales and transfers to organisations under the same control. Exports in all totalled about 22%.

Summaries of payments for certain services make some interesting comparisons possible. The cable industry, for instance, with its £99m turn over, paid out £66,000 for external research work, and spent £210,000 on advertising and market research, and £630,000 on repairs and maintenance. For the £15m turnover lighting accessories trade, the corresponding figures were £4,000 on research, £770,000 on advertising, etc, and £157,000 on repairs and maintenance.

Scarcroft Case Concluded

Ministry partly to Blame, says Lord Goddard

AT the conclusion of the case against the Yorkshire Electricity Board at Leeds Assizes last week, Lord Goddard, the Lord Chief Justice, remarked that a searching enquiry should be made into the whole business of the Board. Just before, he had fined the Board £20,000 on five charges of unlawfully carrying out work at its headquarters; overspending by £41,217 an authority granted by the Ministry of Fuel and Power; doing work not in accordance with plans submitted; carrying out unlawful work on tractor sheds at Scarcroft; and doing unlawful work at Bramhope. The Board had pleaded guilty. Col. W. M. Lapper, chairman, was found guilty of overspending the authority and doing work not in accordance with plans, and sentenced to six months' imprisonment. The deputy-chairman Mr. F. Newey was found guilty of non-compliance with the plans, and fined £100. Both had pleaded not guilty to the same charges, and no evidence was offered on the final two counts.

The hearing lasted five days in all, and some of the case for the prosecution was given in our last week's issue (p. 891). Following Mr. Dodds and Mr. Siviour, Mr. L. T. Appleyard, assistant construction engineer, told the court that he did not include in the figure of £32,000 (the amount authorised) any work other than the building. Such items as heating, painting and furnishing were to be carried out by various departments of the Board. Asked by the judge how he came to be working to a plan not approved by the Ministry, Mr. Appleyard said he received instructions from the chairman immediately the plan had been approved to omit partition walls to a series of offices and designate the room "senior staff dining room." When enquiries began in January, 1951, he continued, he was asked by Mr. Newey to draw a partition on the plan across the dining room to bring the size down to that of the original plan.

Work Not Underestimated

Cross examined by Mr. G. Veale (for Col. Lapper), Mr. Appleyard stated he did not consider work for which he was responsible was underestimated. He agreed with Lord Goddard that the trouble was no one knew what work was going on, various departments were told different things, and no one bothered to get specifications.

Giving evidence in his own defence, Col. Lapper told how the Board never took any precautions to see that the authorisation of the Ministry of Fuel and Power was obtained for big schemes. Any scheme put forward by a chief officer would go to the Board for approval of expenditure and authorisation would be sought from the Ministry by the chief engineer's department. The Board had nothing to do with making applications. He stated the figure of £32,000 did not register in his mind, he did not notice how much was being spent, nor did he inquire about the cost of the building. Col. Lapper also said that with present knowledge it was quite impossible to keep expenditure down to £32,000. He added he was so far removed that he had to rely on other people to carry out their duties.

A Misunderstanding

Referring to the answer suggested as a reply to the question in the House, Mr. Newey said in evidence he had done his best to stop it. Concerning the failure to apply for licences, Mr. Newey spoke of a "broken link" which caused the recognised procedure to obtain 56A authorisation through the chief engineer's department to be overlooked. Because of a misunderstanding the electrical installation and heating had become nobody's business.

In his summing-up Lord Goddard said the case was one of great importance. It had ventilated in open court the methods, administration and organisation of the Y.E.B. The atmosphere of proceedings had been such as to show that the nationalised concern was able to go to the Ministry, request an authorisation and get it; it went ahead and did not take the trouble to discover whether that authorisation had been exceeded or not. Referring to Col. Lapper, the Lord Chief Justice said despite his belonging to so many national and international organisations, if he was appointed chairman of this body, then that was his duty and he should give his time to that for which he was paid. No one would suggest that every detail should go before the Board, but it was certainly the duty of the chairman and deputy chairman to see that the law was carried out. Although it was not his duty to criticise the Ministry of Fuel and Power, he said, it was his duty to relate matters in favour of the defendants. The way the Ministry had dealt with these matters had, he thought, largely contributed to the trouble. It appeared to have been handled in a curiously casual way; it made no inquiry as to what was included in that total sum which was authorised. If the Ministry gave an apparently "blind approval" where was the control exercised?

Lord Goddard said that in spite of evidence given in the witness box, he could see that very little or any blame attached to Mr. Siviour in this matter. Mr. Hylton-Foster, for the Board, added that that was the view taken by all at the Board.

Pronouncing sentence on the Board, Lord Goddard stated he should know where the money came from (the consumers), but a fine had to be imposed which indicated the gravity of the offence. Mr. Newey has decided not to appeal.

Underground Oil Storage in Sweden

IN the immediate post-war years, the problem of storing the large quantities of oil fuel required for the steam plants of the Swedish State Power Board caused considerable anxiety. A simple, though somewhat unusual solution was however thought out by Mr. Harald Edholm, Purchasing Director of the Board. This was to use old mines for the purpose. Small-scale experiments had confirmed his theory that oil could be stored on water along the communicating system principle and that subsoil water could function as an effective caulking agent in preventing the oil from escaping through cracks in the rocks.

The first major storage project utilised an old feldspar mine on the Swedish East Coast. It was first cleaned from loose stone and covered by a heavy concrete roof. A separate water shaft was sunk to the lowest part of the mine and connected with the nearby bay by pipeline. To be sure of ample subterranean flooding a number of well bore holes were also sunk round the mine. Filling the mine with oil began some years ago and since then several hundred thousand tons of oil have been discharged into and unloaded from this giant depot where oil is stored down to a depth of 8,262 ft.

When the depot is completely filled, a shallow layer of water remains at the bottom and this is raised as the oil is pumped out, this keeping the oil surface at a suitable level.

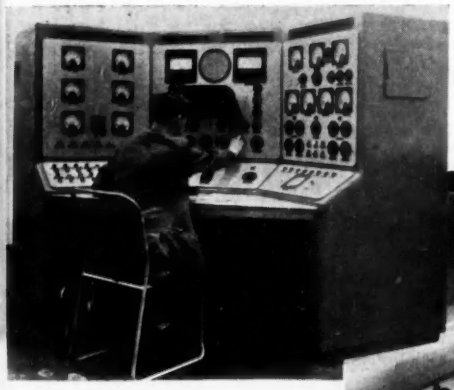
The oil retains a fairly high temperature, and purifies itself to a large extent. In fact, the pump filters have not yet required cleaning and, oddly enough, the water content of the oil taken out of the mine is lower than that of the oil fed into it.

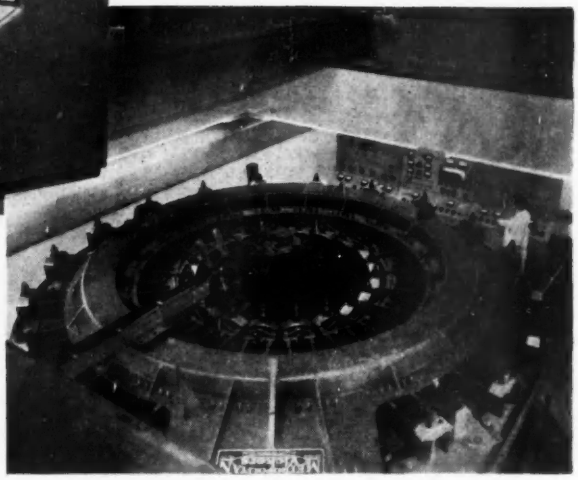
Following the success of this large-scale installation for fuel oil, the method has been extended to apply to petrol and lighter fractions. This scheme—the Viaco Cistern—uses bottle-shaped rock chambers specially blasted, and the petrol or light oil again rests on a water layer. Ground water level must be maintained to give a slight positive pressure within the chamber, and the water level of the underlying layer must be maintained so that the chamber is kept full. After storage it is claimed that the petrol is slightly better in quality, as the slow passage of the subsoil water through it dissolves and removes some of the resins and the sulphur. The general water content remains the same as in the raw petrol and evaporation losses are reduced to a minimum.

At the moment a large plant of this type is being built for the Swedish authorities by the patentees and contractors Svenska Vagaktiebolaget.

THE GLASGOW SYNCHROTRON

The new synchrotron at Glasgow University is at present undergoing its tests. This machine is for work in connection with the investigation of mesons "the bricks of the universe." It has an output rated at 300 MeV and the 125 ton MV magnet is energised with 3,000 amp pulses switched five times a second by B.T.H. Ignitrons.





These two pictures show the synchrotron as installed. Above can be seen the external control desk which is used when the machine is operating. Right is a view of the magnet showing the sliding protective roof which prevents stray radiation

Calculating Machines

High-speed Digital Computers discussed at I.E.E.

FOUR papers presented at the I.E.E. on Tuesday night covered comprehensively the design and operation of the Manchester University computer. Of these four, two had been previously read, the remaining ones being presented for the first time. These latter were entitled "Universal High-speed Digital Computers: A Magnetic Store" by Prof. F. C. Williams, Dr. T. Kilburn and Mr. G. E. Thomas, and "Universal High-speed Digital Computers: Serial Computing Circuits" by Prof. F. C. Williams, Dr. A. A. Robinson, and Dr. T. Kilburn.

Magnetic Storage

It may be recalled from previous accounts of this machine, that instead of using a "memory" of the delay line type, the system of number storage adopted is to use cathode ray tubes in which the numbers are maintained and regenerated on the screens, in conjunction with a magnetic "slow access" store written as magnetic variations on the surface of a rotating wheel. The first of the two new papers mentioned above dealt with this latter store.

The principle of operation is to write magnetically the number on the surface of the drum in a similar manner to steel tape or wire recording and then to read it at the right time from the drum into the rapid access store. It is obvious that the entire system will fail if synchronism between the drum rotation and the rapid access store cannot be achieved with the right degree of accuracy. Some idea of the physical dimensions involved can be obtained from the fact that with 80 binary digits/in., each digit occupied about 0·012 in., and therefore, for reasonable safety, positioning to +0·001 in. was sought requiring precision machining.

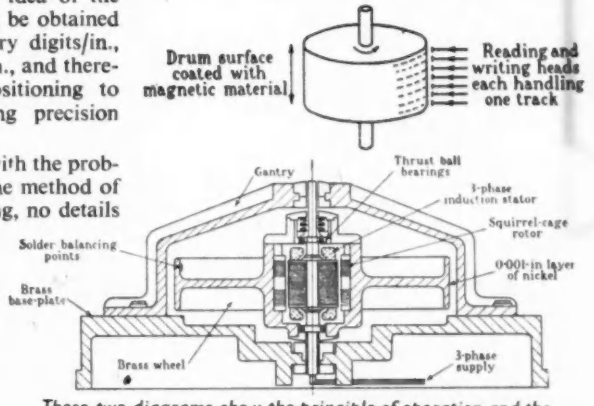
As the paper dealt exclusively with the problems of drum construction and the method of recording, reproducing and erasing, no details of the actual method of ensuring synchronism were given.

The wheel itself consisted of an 11½ in. dia., 2 in. deep machined centrifugal casting in bronze with a plating of 0·001 in. thick pure nickel on the surface. A squirrel cage motor, with its rotor annular to the stator is built into the drum hub. The 36 in. perimeter accommodates 2,560 digits—the same number as can be contained in one unit of the rapid access cathode ray store, and as the wheel rotates at 2,080 r.p.m. the complete unit of 2,560 may be read off in 28·8 millisec. As gaps must exist between successive numbers, these are made equal to 320 digits and thus the equivalent of 2,880 digits can be contained on the perimeter giving a digit length of 10 microsecs. This digit length is that used throughout the machine.

The reading and writing heads are constructed in blocks 2 in. long, and still leave room for much development. Usually 32 simultaneous heads are used, but experiments indicate that 64 parallel tracks may be recorded. In the practical machine, however, two drums are used to provide 64 tracks, 32 on each.

Serial Computing Circuits

The paper on serial computing circuits dealt with the fundamental method of working of the machine, and explained the derivations of adders and subtraction circuits from logical operations. Most of the paper was concerned with the basic arithmetical operations and their translation into circuits and pulse operation, although the method of operation of "shifting" numbers (and thereby multiplying or dividing by powers of two) within the cathode ray tube store was described. From this had developed a practical single storage tube multiplier which was being used experimentally



These two diagrams show the principle of operation and the internal construction of the wheel

The Building Exhibition

"Manual of signposts to efficiency"—Minister's reference to catalogue

THE Building Exhibition which was opened at Olympia, London, last week for a two weeks' run is this year the biggest since the show first started in 1895. Whether or not this is an augury of the success of the new Government's plan to achieve a target of 300,000 houses is not a matter for us to make comment upon but it does seem that manufacturers are alive to the potentialities of a return to private building.

So great has been the response to the idea of the exhibition that for the first time all three halls at Addison Road are now occupied by the show which covers every phase of the building industry. Indeed, as the Minister of Works, the Rt. Hon. David Eccles, M.P., said in his opening speech: "The catalogue of the exhibition is a manual of signposts to efficiency."

A display by the Ministry of Works deals with the design of walls and shows how piping and lagging saves repairs. The Ministry of Fuel and Power, however, have devoted their display to the technical advisory services they offer to help promote the more efficient use of fuel and power.

E. D. A.'s stand is of appeal to builders and architects concerned with the application of electricity to housing schemes. One part shows a full-scale section of that part of a house concerned with the plumbing. The other shows a house half-size, with electrical equipment supplied by the ring main system.

The stands of the exhibition are numbered from 1 to 536 and follow a distinct sequence throughout the exhibition from the Grand Hall, the National and Empire Halls, to the galleries. This makes for an ordered comprehensive tour.

First stand in our tour for extra attention is that of **Aerostyle Ltd.** (B.31), where a display of spray-gun painting equipment is a feature. A first-time exhibit is the "U2" underslung spray gun whose associated 3-gallon container has a pressed steel body and cover.

Flextol Engineering Co., Ltd. (B.36) feature a display of their flexible shaft grinding, cutting and polishing equipment.

Pegson Ltd. (C.59) are exhibiting a selection of electric centrifugal self-priming pumps in addition to their self-contained petrol-operated road rippers and power rammers, whilst next door, on the stand of **Metal Sections** (C.60), particular attention should be paid by architects to the ceiling of the stand which is constructed from Difulite—a method of diffused lighting. The panels are of continuous strips of aluminium.

Felco Hoists Ltd. (C.61) across the gangway have some interesting ½-ton and 1-ton electric chain blocks, whilst their electric wire-rope pulley blocks of 5 cwt. to 2 ton capacity are noticeable for their high-speed lifting and low headroom required.

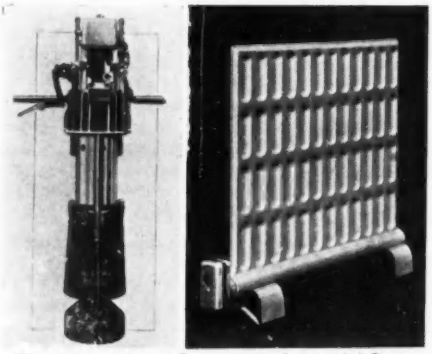
Through the archways in the Grand Hall extension is the stand of **Arthur Lyon and Co. (Engineers) Ltd.** (D.70) whose automatic generating plant is well known to our readers.

Back in the Grand Hall **Aidas Electric Ltd.** (79) feature a display of Sadia electric storage water heaters and Aidas immersion heaters. Particularly interesting is the "UT," a heater complete with thermostat on a head screwed 1¼ in. B.S.P.T., the first of its kind on the market.

Next on this side are **E.D.A.** and **Warsop Power Tools Ltd.** (E.105). The well known Warsop self-powered concrete breaker has a wide range of attachments making it a valuable unit. Apart from breaking work it can be used for light ramming, making post holes, pile driving, etc. The D.P. rock drill and the Benjo power rammer are featured, the latter useful for filling cable trenches, etc., is supplied with an alternative 7½ in. G.P.O. type rubber foot.

Langley London, Ltd. (F.129) should not be missed, the tile work and waterproofing building paper for concreting are important. Whilst across the gangway are the displays of **Flexaire, Ltd.** (G.140) with space heating equipment and **G. A.**

The Kango electric hammer is admirable for chasing brickwork for conduit



The Warsop Benjo Rammer and a model from the Dimplex range

Harvey and Co. (London), Ltd. (G. 147-8) have an important display of pipe work, wire work, including an attractive feature of cable-fixing trays which exemplifies the efficiency of this method of running cables along concrete and steel structures. Stand 188-195 is occupied by a display devoted to past and present techniques of leadwork organised by the **Lead Industries Development Council** and across the gangway there is a display of tube-bending equipment by **W. Kennedy, Ltd.** (K.232).

Clock systems are featured on stand H.186 and 197 by **English Clock Supplies Ltd.**, whilst further east is a display floor treatment equipment by **Cimex-Fraser Fuson Ltd.** (H.184). These floor maintenance machines are electrically operated and are designed to save labour, reduce fatigue and give maximum efficiency.

Kango Electric Hammers Ltd. (H.178) feature an extremely interesting display of electric hammer equipment. The E. F., and G. types have many adaptations for various tasks whilst the spade hammer is most suitable for ease in trench digging, the Kango ballast tamper is incidentally widely used by British Railways.

Rawlplugs are well known to most of our readers. They are featured in the display by the **Rawlplug Co.** (L.239), together with a range of Rawltools and the Rawlplug drill-hammer.

Philplug Products (H.173) also specialise in fixing devices and have a large display on their stand with practical demonstrations given daily.

Back in the Grand Hall annexe we find the stand of **R. A. Lister and Co., Ltd.** (H.170-1) with a display of their well known petrol and diesel engines and electric generating sets and pumps. An interesting feature is the new "Eclipse" self-propelled tower-ladder truck.

Before leaving the Grand Hall the display of **British Equipment Co.** (J.210) demands attention. This firm as readers know manufacture the "Tarplaner" and the "Skilsaw" electric tools which are needed in a self-respecting woodworker's shop.

The first stand in our route in the National Hall is that of the **Ductube Co.** (M.258-9) who are proud of their patent Ductube duct-forming gear. On the other corner is a display by **B. O. Morris Ltd.** (260) of Morrisflex flexible shaft tools for stone, marble and terrazo work.

A mammoth concrete mixer attracted our attention on the **Liner Concrete Machinery** stand (N.267-8). This "Cumflow" 14 cu. ft mixer is a portable electric motor driven plant. Not far away is a display of hoist equipment by **A.C.E. Machinery** (O.281-2) who have introduced this year electric and petrol-driven "Humdinger" immersion type concrete vibrators.

Stand N.273/3 is occupied by **Stewarts and Lloyds, Ltd.**, who are well known in the industry for the pipe and iron work, lighting columns and the tubular steel work of their subsidiary Tubewrights, Ltd.

Copper is widely used to make an attractive feature of the **Copper Development Association** (Q.306) display. It is an excellent advertisement for the properties and virtues of copper in building whilst **E. P. Allam and Co., Ltd.**, (O.309) feature an extra high frequency electric internal vibrator of a new pattern.

R. G. Dixon Co., Ltd. (Q.312) further on along the gangway are featuring their "Dixon" floor treatment units. Many are to be seen in action. Most interesting is the Columbus "Mechanical Charwoman" which comprises two interchangeable units round one basic electric motor. Its uses—floor scrubbing, drying, polishing and vacuum cleaning.

Close by is the stand of **Adam and Harvey** (R.314) where the Rapid Hammer, a tool similar to the "Ramset" plug fixing gun (see ELECTRICAL TIMES, November 1 issue) is being demonstrated, and the stand of **S. N. Bridges and Co.** (R.315), specialists in electric wood working tools.

En route to the National Hall, is the exhibit of **Jenson and Nicholson** (S.330), devoted to uses and properties of "Cuprinol" wood preservative; they are U.K. distributors. Up in the Grand Hall gallery the stand of the **Flexible Drive and Tool Co.** (423) first merits attention. The new "Baxtul" chipping hammer and the range of l.f. electric concrete vibrators are shown. Opposite is a display by the **Central Tool and Equipment Co., Ltd.** (424), featuring the new "Centec" Senior electric routing tool, whilst at the east end of the gallery is the show of **Gulf Radiators, Ltd. and Hurseal, Ltd.** (439), which features the radiators, both hot water and oil-filled electric, which are made by the companies, together with examples of the new Hurseal unit heaters and cylinder jackets recently introduced. Passing **Shaftesbury Ladders** section (470-472) where street lighting engineers will be able to see the firm's tower ladder equipment represented by dual-purpose trailer and mobile tower units, the visitor will arrive at the **Simplex** (481) display featuring thermostatically controlled oil-filled electric radiators in various sizes and in high gloss enamel finishes. The visitor, however will probably be distracted by the somewhat noisy demonstration of the "Supa Dynamic" plug driving gun introduced by **F. H. Bowner and Co. (Engineers), Ltd.** (491). It is a tool similar to the Rapid Hammer mentioned earlier.

overseas news

Straight Talking

Indicative of the difficulties which have beset the Sydney County Council, N.S.W., in its power plant expansion programme, were two further labour troubles which arose quite recently. In each case it was the new Pyrmont station which was affected. In the first, some 200 metal workers went on strike, claiming that five contractors were not paying a travelling time allowance which other contractors were giving. In the second case, four boilermakers and six iron workers, although getting height money under a Metal Trades award, refused to work on a smoke stack above the existing height of 60 ft unless paid time and a third for work 50 ft to 100 ft up; time and a half 100 to 150 ft; and double time above 150 ft. It was this demand which provoked the Federal Conciliation Commissioner, Mr. V. G. Hall, in giving his decision on the dispute, to remark that the unions had succeeded in obtaining payments for their members at Pyrmont "much in excess of what would be paid if the State was not in such dire need of a huge increase in electricity supplies." The rates were so excessive, he added, that, as a conciliator, he could not suggest a means of settling the dispute unless he had jurisdiction over all employees on the job. If he had that jurisdiction, substantial reductions in wage rates would result, Mr. Hall declared.

Dependence on Water

Only the fact that the Winnipeg River has been flowing at a much greater rate during the past three years than should ever be expected, had prevented a power shortage in Manitoba, according to Mr. D. M. Stephens, chairman of the Manitoba Hydro-Electric Board. He stressed that this was the sixth consecutive year that the Winnipeg River flow had exceeded the normal flow of 18,000 cu ft/sec. Their principal worry now was what would happen if a really dry cycle were to occur, he emphasised. To meet the expected increased power demand, he went on, they should now have plans on the drawing boards for plants that should be begun immediately after completion of the Pine Falls project. It is expected that the first units at this station will be in operation before the end of the year.

Mr. W. H. Carter, president and general manager of the Winnipeg Electric Co., has revealed that the company's proposed steam generating plant, which was to have had an ultimate capacity of 100,000 h.p., has been shelved for the present. The company had got as far as surveying the proposed site, but had called a halt when the Premier had announced that the provincial government was going ahead with an Act to enable it to acquire private power companies, he explained.

St. Lawrence Seaway

Official notification of the Canadian Government's intention to recommend that the St. Lawrence Seaway and Power project be built by Canada alone, has been given by Mr. L. B. Pearson, Minister for External Affairs. They would soon request, and expect to receive, that co-operation from the U.S. Government which was required under the boundary waters treaty, he added, and then outlined the various steps which are to be taken by Canada to achieve that goal. Mr. Chevrier, the Minister of Transport, has this week introduced a resolution calling for the creation of a "St. Lawrence Seaway Authority," to provide a deep waterway, and probably later this month a second Bill will be submitted to Parliament seeking a new joint agreement between the Federal Government and Ontario respecting development of power in the international channel.

Transformation

Hamilton, Ontario, is one of those progressive towns where the old tramcar system has been completely modernised by the change over to trolley buses. It was only five years ago that the Hamilton Street Railway Co. purchased and took over operation of the tramcars from the Hydro-Electric Power Commission, and since that time the tracks have steadily been torn up, making way for trolley bus operation. The final phase of the transformation took place last month. A number of petrol-engine buses were purchased and operated while the conversion was in progress, but these will now be used only for rush hour and other emergency services.

To Change?

With its existing electricity supply franchise with the Northern British Columbia Power Co. due to expire in 1954, the Prince Rupert City Council has decided to have a referendum of whether this should be renewed or arrangements made with the British Columbia Power Commission.

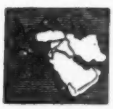
Another Station for Finland

Plans for a new hydro-electric station on the Jumiskojoki River have been prepared by the Finland electric power company, Pohjoban Voima Oy. The station, which will be situated about 100 metres underground, will have a capacity of 30,000 kW, and provide an estimated yearly output of 100 million units. It is intended primarily to supply the Nordoester province and Lapland, and be connected to the national electricity network. The station is expected to be in operation within three years.

New Paris Tube Train

A prototype tube train, fitted with pneumatic tyres and horizontal bogie wheels, is now in use on the Paris underground system. The train has three carriages and ensures improved passenger comfort, power and material economy as well as increased safety devices, it is stated. Each carriage is supported at both ends by a set of four wheels equipped with heavy duty tyres. The carriage is kept on the rails by fore and aft horizontal twin bogies sprung against the inside face of the rails. It is claimed that the new form of wheels saves 21 tons in weight and that less and lighter materials have been used for suspension and body work to dampen down vibrations and shocks. The reduced weight will lighten the work for the two 130-French-horse-power motors employed.

Israel to use Wind?



The latest country to consider experiments on wind power generation of electricity is Israel. Here, as part of a programme of assistance to small nations, Unesco has asked Mr. E. W. Golding, M.Sc.(Tech.), M.I.E.E., M.Amer.I.E.E., M.I.B.A.E., head of the rural electrification and wind power generation department of the Electrical Research Association, on their behalf to advise the government of Israel as to the best methods of exploring the potentialities of wind power for electricity generation in that country. The problem of sources of power is one of great difficulty to countries such as Israel, so that sources which may be uneconomic elsewhere have to be taken into account. At any rate, industrial concerns in Britain concerned with developing equipment for wind power generation will be interested in this venture. The E.R.A. has granted Mr. Golding leave of absence from Leatherhead in order to accept Unesco's invitation.

Interim Development

As a result of the recommendations of the Electricity Development Committee, the government was now engaging consultants to go out to the Territory to prepare a scheme for the interim development of power in the Kafue Gorge, Mr. R. A. Nicholson, Economic Secretary, has announced. The intention was not to compete with the Kariba scheme but to cover the difficult period that it was foreseen would develop in the power situation before the enormous Kariba scheme could be completed, he stated.

Programme for Nigeria

An extension programme of development, costing some £11 millions, has been drawn up by the Electricity Corporation of Nigeria, the new organisation which was established by an Ordnance of the Nigerian Government. In April last, the Corporation took over a number of undertakings formerly operated by the government, and it will shortly absorb similar undertakings now owned by some of the native administrations. The existing power stations, thermal and diesel, are not interconnected, many being in isolated townships and difficult of access. The new programme on which the Corporation has embarked involves the improvement of existing stations, the erection of new stations including a large one at Mamu River close to coal mines, with a transmission network connecting Lagos, Ibadan, Abeokuta, Oshogbo and other areas in the Western Provinces. It is also proposed to link up Port Harcourt, Aba and possibly Calabar in the Eastern Provinces, with the new grid, and to extend a service in the direction of Abakaliki to serve lead and other ore mines and a new large cement works. At Kano, in the Northern Province, an extension to the existing power station and distribution is already in hand. It is hoped to complete an important portion of the programme by 1956, by which date some £11 millions will be expended. A further development will take place in the provision of hydro-electric power stations at suitable centres when the necessary resource research has confirmed the practicability of such schemes.

Uganda Finance

Within the next few months the Uganda Electricity Board is to raise £5¾ million in Britain towards its £15 million hydro-electric project at Owen Falls on Lake Victoria, the source of the White Nile. A loan for £3,100,000 has already been floated. After more than two years work the 2,725-ft dam is taking shape. This week the foundations for the first generator were being laid with 1,300 African labourers working 24 hours a day. The first 15,000 kW set is expected to be in operation within 18 months.

Loan for Colombia

The International Bank for Reconstruction and Development has made its third loan for electric power development in Colombia. This loan, of $2,400,000, has been made to the Central Hidroelectrica del Rio Lebrija, Limitada, a publicly owned company, and was guaranteed by the Government of Colombia. Increased power, which will be available when the Lebrija hydro-electric project is completed, will relieve the acute power shortage in Bucaramanga, the centre of the rapidly expanding tobacco industry. The new loan will be used to finance the major part of the foreign exchange cost of the Lebrija hydro-electric project, the total cost of which is estimated at the equivalent of $6,897,700. The project consists of the building of a generating station, the construction of transmission lines and the enlargement of the present distribution system. The plant will have an installed capacity of 9,500 kVA, but is designed for an eventual maximum output of 19,000 kVA. Work on the project is already at an advanced stage—about 70% completed—and is scheduled for completion by May, 1953.

PERSONALITIES

IN THE INDUSTRY

Formerly station superintendent at Padiham generating station, North Western Division of the B.E.A., **Mr. H. H. Hall,** ASSOC.I.E.E., M.INST.F., has been nominated to a similar position at the Division's new Huncoat power station. Mr. Hall served his apprenticeship with the Maidstone Corporation Electricity Department, afterwards joining the Lancashire Electric Power Co., with whom he held various positions from 1922 to 1948. It is expected that the Huncoat station will go into operation within the next few months.

Mr. H. H. Hall

At Padiham power station, **Mr. W. Blythe,** B.SC.(ENG.), A.M.I.E.E., succeeds Mr. H. H. Hall as station superintendent. Mr. Blythe has occupied a similar post at the Burnley generating station since 1948. His service with the supply industry began in 1915 with the Cleveland and Durham Electrical Power Co., and he went to Burnley in 1926 as junior engineer, soon being appointed shift charge engineer. In 1940 he was nominated station superintendent and technical assistant, a position which he held till vesting day.

Just arrived in this country after a short visit to the U.S.A. is **Prof. M. S. Thacker,** B.SC.(ENG.), M.I.E.E., F.AMER.I.E.E., M.INST.F., M.I.E.(IND.), A.M.I.R.E., head of the Department of Power Engineering and Electrical Technology at the Indian Institute of Science. He is here on work in connection with the Institute and expects to return to India next week-end. Meanwhile he may be contacted c/o the High Commissioner for India, in London.

Aboard the *Capetown Castle*, which sails from Southampton for South Africa today, Thursday, is **Major R. Amberton,** M.I.E.E., a director of the Dorman and Smith group of companies. The purpose of his trip is to inspect the businesses of the group in the Union, we understand.

Sir Alexander Roger, K.C.I.E., who is chairman of the Anglo-Portuguese Telephone Co., British Insulated Callender's Cables Ltd., and the Automatic Telephone and Electric Co., left last Friday for one of his periodic visits to Portugal.

Mr. M. Gaughan, B.ENG., A.M.I.E.E., F.I.E.S., has been appointed to the Government and Railways Department of the B.T.H. Lamp and Lighting Department at Mazda House, Fitzroy Road, London N.W.1.

Mr. Roderick Childs, M.I.EX., since 1939 export manager of Thorn Electrical Industries, Ltd., has left that company and is off on another overseas tour via Pakistan, India, Ceylon, Malaya, Australia and New Zealand, but this time he will remain permanently in Australia where he will act as a marketing consultant for domestic appliance, radio component, electrical, lighting and associate manufacturers. He will be covering New Zealand and Indonesia as well as Australia, and would like to hear from old friends at his accommodation address c/o Harold Yates and Son, 54 Oxford Street, Sydney, Australia.

C. C. Wakefield and Co., Ltd., announce that their Industrial Lubrication Service is now organised on regional lines under the direction of regional sales managers. **Mr. C. W. Page** has been appointed sales manager of the Eastern Region in succession to **Mr. B. S. Davis,** who has resigned from the company. Mr. Page joins Messrs. **J. E. S. Elwell** and **D. S. Kirkpatrick,** Northern and Western regional sales managers respectively.

Mr. J. K. Davies has been appointed a director of India Rubber, Gutta Percha and Telegraph Works, Ltd.

The Swedish Academy of Sciences announced last Thursday that the 1951 Nobel Prize for Physics had been awarded jointly to **Sir John Cockcroft,** C.B.E., F.R.S., M.A., PH.D., M.SC.(TECH.), M.I.E.E., director of the Atomic Energy Research Establishment at Harwell, and **Prof. E. T. S. Walton,** M.A., M.SC., PH.D., of Trinity College, Dublin. The award has been made "for their pioneer work on the transmutation of atomic nuclei by artificially accelerated atomic particles." They share a prize of £11,175. Next March Sir John Cockroft will succeed Sir Henry Tizard as chairman of the Advisory Council on Scientific Policy to the Defence Ministry. Both he and Prof. Walton were trained under the late Lord Rutherford, Cavendish Professor of Physics at

Sir John Cockcroft

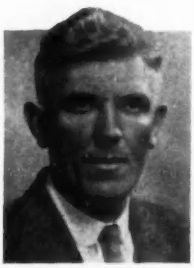
Prof. E. T. S. Walton

Cambridge. While working at Cambridge in 1932 with his fellow prize-winner, Sir John became the first scientist to split the atom by mechanical means. Prof. Walton has been Erasmus Smith's Professor of Natural and Experimental Philosophy at Trinity College, Dublin, since 1946.

His many friends and business connections will be interested to learn that **Mr. A. McEwan,** M.I.Struct.E., who is in charge of the Structural Division at Chamberlain Industries, Ltd., has been appointed a director of the company.

The new station superintendent at Huddersfield power station, Yorkshire Division, B.E.A., is **Mr. K. N. Greenhow,** who was formerly the deputy superintendent there. He succeeds **Mr. F. Bates,** who has taken up a similar post at the Thornhill station, as we earlier noted.

We learn that **Mr. W. R. Jones,** who joined Nevelin Electric Co. Ltd., from Lancashire Dynamo and Crypto (Mfg.) Ltd., an associated company, in January of last year, has now been appointed chief engineer. Educated at the Manchester College of Technology, Mr. Jones served his apprenticeship in the Trafford Park Works of L.D.C. Subsequently he spent a year in the General Contracts Department at the same works and was then transferred to the Planer Department. In 1947, whilst still in the Planer Department, he took over the handling of all the 'Varionic' drives which, because of the size of equipment, required the association of Trafford Park motors with Nevelin rectifiers.



Mr. W. R. Jones

Mr. G. Lloyd-George has resigned from the board of the Superheater Co. Ltd. on his appointment as Minister of Food.

Mr. W. H. C. Pilling, B.A.(cantab), M.I.E.E., now generation engineer (construction) of the Southern Group of power stations in the Yorkshire Division of the B.E.A., has been appointed chief generation engineer (construction) of the Merseyside and North Wales Division, in succession to **Mr. F. H. S. Brown** who has gone to B.E.A. headquarters, as we have earlier noted. Mr. Pilling gained early experience as assistant resident engineer at the Droogenbosch power station, Brussels. In 1928 he joined the Yorkshire Electric Power Co., serving with that concern for 20 years, first on the erection of o.h. transmission lines and later as chief to the power station construction engineer. In 1948 he became deputy generation engineer (construction) of the central group of power stations of the Yorkshire Division, and a year later took up his present position.

Another who has completed half a century of service in the electrical industry is **Mr. S. H. Fowles,** M.I.Mech.E., M.Inst.C.E., M.I.E.E., district manager at Heston to the Southern Electricity Board, who, although due to retire at 65 years of age, in September last, is staying on until a new manager has been appointed, we understand. His experience during that time has been quite varied. Beginning with T. W. Heath and Sons, of Kensington, then with Dick Kerr and Co. on tramway construction in Leicester and Hastings, and after a spell with the Scottish Central Power Co., he served under the late Mr. Charles Vernier with the North East Coast Electricity Supply Co. Moving on, he gained subsequent experience at Dewsbury, Stoke-on-Trent, Aylesbury (as deputy chief), Birmingham, Sunderland (as resident engineer at the Hylton Road station), and Chesterfield (as deputy chief) before taking up his first appointment as chief to the Ilkley U.D.C. undertaking. Succeeding the late Mr. Hollyer, he was appointed to a similar post at Loughborough before joining the Heston and Isleworth U.D.C. undertaking as chief in 1932, which position he held till vesting day, when he became district manager with the Southern Electricity Board. On leaving the Board's service, Mr. Fowles intends to carry on a consulting practice at 117 Wood Lane, Isleworth, we learn—he is not unused to such work, for some little time ago he acted in that capacity to the Bolsover Council, Derbyshire.

Mr. S. H. Fowles

Philips Electrical Ltd., have announced several new appointments. **Mr. N. D. Houston** is now regional manager of the Glasgow branch following the resignation of **Mr. W. S. Harris,** The firm's radio representative in Scotland **Mr. W. L. Hay** has been made manager for radio and television. At the Cardiff branch, **Mr. J. Jordan** becomes manager in succession to Mr. Houston, and finally, **Mr. K. A. Bromley,** who has been lighting sales engineer at the Leeds branch, has been appointed assistant to the regional manager of the company's Manchester branch.

The North of Scotland Hydro-Electric Board has appointed **Mr. J. E. Whittaker** to be manager of the board's Aberdeen area in succession to **Mr. Alex. Gardener,** B.Sc., M.I.E.E., who is retiring at the end of this year, as we have already noted. Mr. Whittaker, who is at present deputy manager, gained early experience at Bradford before going to Aberdeen in 1937, subsequently holding positions of substations engineer and assistant distribution superintendent, chief technical assistant and deputy city electrical engineer. He became deputy area manager when the undertaking was vested in the N. of Scotland board.

Appointed station superintendent at Hackney generating station, London Division, B.E.A., with effect from Dec. 1, is **Mr. L. C. Ralphs,** who since November, 1948, has occupied a similar position at the St. Pancras station. After technical education at Wolverhampton and Staffordshire Technical College, he gained experience with the Midland Electric Corporation for Power Distribution Ltd., prior to going to Ironbridge generating station of the West Midlands J.E.A. in 1932 as control engineer. Two years later he transferred to Ocker Hill station as charge engineer, and then went to Bradford in a similar capacity. In 1939 he became engineer-in-charge at Littlebrook power station, and in 1943, charge engineer at Battersea generating station of the London Power Co., holding that post till going to St. Pancras in 1948.

Mr. L. C. Ralphs

The Edison Swan Electric Co. Ltd. announce that as from November 30, **Miss Nora E. Miller** is resigning her position as manager of the Publicity Dept. Her resignation results from a long period of ill health, but her many friends will be glad to learn that she is now making satisfactory progress towards recovery after prolonged hospital treatment. Miss Miller has been publicity manager for 24 years—the company will continue to utilise her services in an advisory capacity. The firm's new publicity manager will be **Mr. McK. E. Tatchell,** F.R.S., M.I.A.M.A., now assistant advertising manager to British Overseas Airways Corporation. His knowledge of advertising is the outcome of early days in Fleet Street. Before going East he visualised for Saward Baker & Co. and in 1934 was appointed art director to D. J. Keymer & Co. Ltd., India. During the last war he served as a major in the Indian Army.

Miss Nora E. Miller

Mr. McK. E. Tatchell

Just nominated engineer-in-charge of the B.B.C's television transmitting station now being built at Kirk o' Shotts, between Glasgow and Edinburgh, is **Mr. J. Cleland,** who has been acting engineer-in-charge at Westerglen, the Scottish Regional station, for the last few months. Mr. Cleland's assistant will be **Mr. W. L. Nicholl,** at present one of the senior engineers at the Skelton short-wave transmitting station.

Mr. S. R. Siviour, O.B.E., M.I.E.E., has been invited by the Chairman of the Uganda Electricity Board, Mr. C. R. Westlake, to assist the Board in planning and organisation problems in connection with the Board's transmission scheme for a period of six months.

Our photograph below was taken during the recent visit to Scottish Cables (S. Africa) Ltd., Pietermaritzburg, of Mr. William Fraser, snr., chairman of Scottish Cables Ltd., Renfrew, Miss Margaret Fraser and Mr. William Fraser, jnr. Left to right are W. E. L. Tomkinson, N. N. Lunt (director), W. Fraser, jnr., A. C. Grant, Miss Margaret Fraser, J. Jeans, W. Fraser, snr., D. G. Sutherland (director) and J. C. Sutherland (director).

OBITUARY

Mr. J. D. Midforth, A.M.INST.C.E., M.I.E.E., sub-area engineer of No. 1 Sub-area of the Southern Electricity Board, died recently, aged 51, after several years of poor health. Prior to nationalisation he had been transmission engineer to the Metesco group of companies, which he joined after serving as technical assistant with the Dundee Corporation undertaking.

Mr. H. L. McMichael, M.I.E.E., M.BRIT.I.R.E., chairman and managing director of McMichael Radio Ltd., died on November 17, aged 67. He was a familiar figure in the radio industry from its earliest days, being among the first to hold a receiving and transmitting licence.

Mr. G. W. Hird, late superintendent with the Eastern Telegraph Co., Ltd., died on November 16, aged 78.

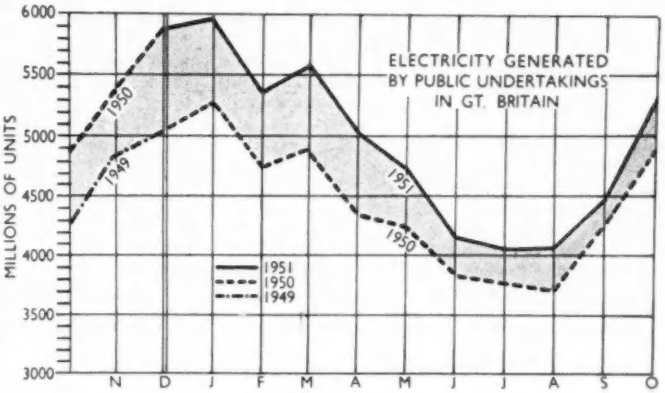
Mr. A. Atherton, M.I.MECH.E., vice-chairman of Herbert Morris Ltd., since 1949, died on November 14, aged 69.

UNITS GENERATED

5,289 million units was the total generated during October in stations under the control of the B.E.A., the North of Scotland H.E. Board and the Lochaber Power Co. The corresponding figure last year was 5,289 million, so there has been an increase of 9·6%.

Of the total, 5,173 million units was generated in steam stations and 103 million in hydro-electric.

Energy sent out during the month was 4,986 million units, 94·4% of that generated. This gives the total for the year up to October 31st as 45,911 million units, showing an increase of 11·3% on the same period in 1950.



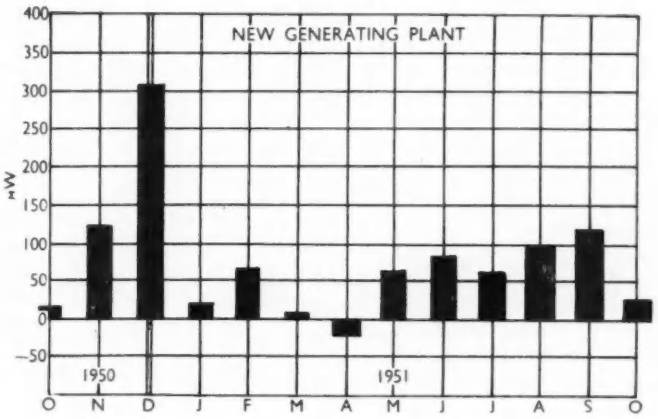
POWER SUPPLY IN OCTOBER

NO new turbo-alternators were commissioned by the B.E.A. during October, but output capacity at two stations was increased by the completion of boilers. The first of these was brought into operation at Cliff Quay, in the Eastern Division. A Babcock and Wilcox unit, rated at 365 klb/hr., it is the eighth to be completed at Ipswich and leaves only one more set and one more boiler for the completion of that station. The other boiler is also a Babcock and Wilcox design, this time for Braehead (Renfrew) in the South West Scotland Division. The second to be commissioned here, it is rated at 300 klb/hr. for 900 lb/sq in., 900 ° F t.s.v. conditions.

With the winter now with us, some of the increases in fuel and demand for the earlier part of the year make interesting reading. So far, generation has increased by 11·4% and to achieve this, there has been an 11% increase in coal consumption and a 31·8% increase in oil, all comparisons being with the corresponding periods of 1950. The rate of increase of generation has probably been raised above the mean value by the weather which has been an average of 1·7° Fahrenheit colder than 1950.

Hydro-Electric

The weather, in so far as it has been dry, has also had an effect on hydro-electric generation, for at 1,132 million units total for ten months, this is 4·7% down on last year, though for the first part of the year the ratio was 12·3% up. Against this has to be set the greater amount of water turbine capacity in operation.



GENERATING PLANT

At the end of October, 1951, the installed capacity of the B.E.A. was 14,992 MW, showing an increase of 5 MW during the month. During the same period the North of Scotland total went up by 22 MW to 615 MW. The month's commissionings bring the overall increase during the past twelve months to 962 MW, or 6·6% of the October, 1950, total.

The total installed capacity used for the purpose of this graph should be distinguished from the output capacity. The installed capacity is the total m.c.r. of all the generating sets which are connected on both steam (if appropriate) and electric sides, and are suitable for service.

Problems of Indian Undertakings

OPERATION of the Electricity (Supply) Act, 1948, has provided many opportunities for the Federation of Electricity Undertakings of India to be actively concerned in protecting the rights of its members within the framework of the Act. That such vigilance is necessary, and justified, is obvious from the report of the Association for the year ended June 30 last, just to hand. In addition to many matters which have already been reported in our pages, the report makes reference to the question of variations of tariffs within the limits laid down in the Act. For, although the sixth schedule, in effect, regulates the profit which a licensee may earn by adjustment of tariffs, different interpretations of the wording have been given by two State Governments. Earlier this year, the matter was raised with Dr. Menon, a member of the Central Electricity Authority, proposing an amendment of the section, and urging that the question be viewed on practical rather than on doctrinarian lines, but, so far, without result.

Representations have also been made to the Central Water and Power Commission concerning the absence of protective legislation against requisitions from owners of private lands demanding the shifting of transmission lines. The importance of the matter was stressed in view of the fact that many undertakings propose to launch rural electrification schemes using o.h. lines. The Commission have this point under consideration.

In commenting on a draft of the revised Indian Electricity Rules, the Federation also emphasised the need to cheapen the cost of rural distribution networks, a point which was reiterated when the regulations governing the placing of o.h. transmission lines across railways were under review.

Government control of trade and industry in general has also been closely watched, and, apart from interest in such matters as Tariff Board inquiries into the granting of protection to local manufacture of equipment, such as transformers, representations have been made during the year on the import control of heavy electrical plant, electric motors over 30 h.p., and insulated wires.

One note which, although serious, has its humorous side, relates to the practice of certain electricity consumers tampering with electric motors, whereby the original nameplates indicating the horse-power are removed and others showing a lower h.p. substituted. Thus, these consumers, on industrial power tariffs based on the b.h.p. installed, were defrauding the undertaking. The Federation asked the various motor manufacturers in India if the h.p. of each motor could be stamped on the end of its shaft, where it could not be cut away or filed off. But, as the result of other proposals, the Indian Standards Institution has been considering the question of making a deep stamping of the h.p. on motors a provision in future specifications for such machines.

EXPANSION IN PRETORIA

IN the early part of next year the first section of the Pretoria City Council's large electrical extension scheme will be brought into commission. The whole scheme comprises the erection of a new station with an ultimate capacity of 180,000 kW at a cost now estimated at £8,372,000, as against £8,302,000 originally. The new power house will be adjacent to the old station and will eventually contain six 30,000 kW turbo-alternators and ten 210 k lb/hr boilers.

British Plant

The first section, to be brought into use next year, comprises two English Electric turbo-alternators and four Yarrow boilers, and this section will be followed by another turbo-alternator and two boilers scheduled for commissioning in September, 1953. In view of the present rate of load growth it is anticipated that the fourth set will be required to meet the winter load of 1957 to be followed, by the commissioning of the remaining plant in 1959 and 1960 respectively.

In view of the lapse of about six years from the placing of orders to the time of commissioning the plant, the City Council, on the advice of the city electrical engineer, now proposes to place an order for the fourth turbo-alternator and boiler together with the associated equipment. Also, having regard to prevailing abnormal conditions, the Council proposes to negotiate a contract price for the extensions with the suppliers of the plant already contracted for the initial stages of the scheme, and the consulting engineers, Messrs. Merz and McLellan, are being authorised to proceed on this basis. In this way time and expense will be saved by reason of the fact that all design and technical details have been settled and the numerous working drawings prepared. It will also facilitate the placing of contracts for the civil works.

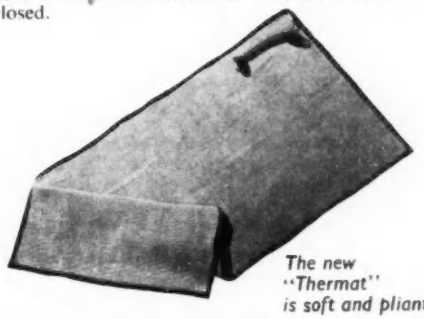
Early on official sanction of the Administrator and the Union Treasury was received to the borrowing of £4,559,000 for the first portions of the scheme, and recently similar sanction has been forthcoming for a further sum of £3,743,000 to finance the completion of the building and the installation of the last three sets and four boilers. As the total of these sums falls short of the present estimated cost, additional authority for a further £70,000 will have to be obtained.

That such expansion in plant capacity is necessary is shown by the growth of the Pretoria Electricity Department. In 1940 the number of units sold amounted to over 113 millions. Five years later the figure was more than 249 million units. For 1950, units sold amounted to close on 400,000,000. The installation of electric cookers alone has increased from 7,902 in 1940 to 15,823 in 1950, and water heaters from 783 in 1940 to a total of 7,434 in 1950.

The BUYER'S *Column*

The new "Thermat" blanket

THE new "Thermat" electric blanket, an improved version of a well tried and trusted product, has been recently introduced by H. J. BALDWIN and CO., LTD., Baldwin House, 132 Arkwright Street, Nottingham. It is an open weave blanket, light and pliant, with the heating element incorporated in the weft thereby ensuring even heat distribution. The element is completely protected; its design, it is said, eliminates the need for a thermostat for it cannot overheat if used in accordance with directions enclosed.



The new "Thermat" is soft and pliant

Awarded the Star and certificate of the Good Housekeeping Institute, the blanket is designed for years of trouble free service.

Available with switch, 9 ft of flexible cable and adaptable l.c./2-pin plug, the Thermat is suitable for use on a.c. or d.c. 200/220—230/250 V supplies. Guaranteed for one year from date of purchase. Prices are: Model "M" 51 in. x 30 in. £9 7s. 6d. (inc. P. Tax) Model "L" 51 in. x 60 in. £15 (inc. P. Tax).

"Telecene" speeds soldering

TELECENE liquid activated rosin-based flux has been developed by the manufacturers, H. J. ENTHOVEN AND SONS LTD., of 89 Upper Thames Street, London E.C.4, because of the necessity of providing a rapid working and really effective flux as an essential aid in the work of the electrical and electronic engineer.

This is especially necessary in those soldering operations in which it is preferable, for special reasons, to use a solid solder wire rather than a rosin-cored solder.

Telecene consists of high-quality rosin dissolved in methylated spirit and contains an activating agent similar to that incorporated in the popular Superspeed "White Flash" activated rosin-cored solder produced by the same company. Advantage of the activating agent lies in the fact that it gives the rosin a much more vigorous fluxing action.

Mass dip-soldering operations can be performed with a high degree of efficiency particularly in soldering electric motor and dynamo armature commutator connections.

Other applications in which Enthoven's Telecene activated rosin-based flux are put to outstanding use are in fluxing before pre-tinning the radial contacts of selector and uni-selector multiple banks; mass-soldering of rotary switching apparatus of the type incorporating ribbon multiple; dip-soldering coil winding ends and flexible cord multi-strand conductors, anchoring the sensitive hair-springs of measuring instrument movements and many other delicate fluxing operations.

Bunkering problems—a solution

POWER station engineers and others with bunkering or stockpiling problems will be interested in an ingenious new development recently marketed by C. H. JOHNSON (Machinery) LTD., Adswood, Stockport.

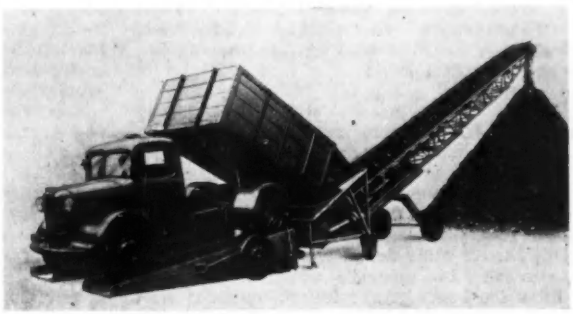
The "Hylo-veyor" Ramp loader has been designed to take the discharge straight from end tipping lorries and conveying it along a ramp depositing the material to form a pile up to 20 ft in height.

The equipment comprises the well known Hylo-veyor, a special portable wide hopper and a mobile ramp.

The hopper is wide enough to take all widths of lorry and is mounted on four pneumatic wheels, two of which are fitted to the swivelling axle which is complete with a steering arm. This hopper straddles the bottom section of the Hylo-veyor and is designed so that the Conveyor can operate from horizontal to maximum discharge height to eliminate breakage of material.

The mobile ramp consists of two troughs of

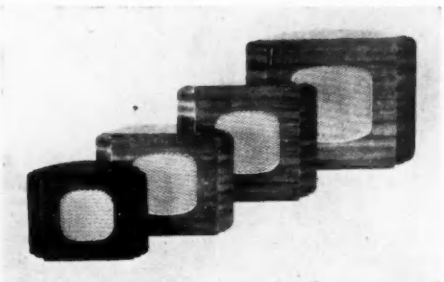
Storing and stockpiling of coal etc. presents no problem when the portable Hylo-veyor Ramp loader is used



chequered plate able to accommodate all lorry wheels. These troughs are 12 ft long, supported in a braced structure which gives a vertical height of 2 ft at the back of the troughs. The side plates to the troughs are splayed out at the bottom end to give a guidance to the lorry wheels. The complete machine is mounted on two pneumatic wheels attached to pivoting brackets fixed to the structure. These brackets are in turn attached to two hydraulic jacks operated by one hand pump mounted on the machine. When the ramp is in the operating position, the wheels are retracted and the ramp sits on its base. To move the ramp, the jacks are pumped up, lifting the machine clear from the ground, when it can be easily moved around by a hand bar fixed between the troughs. For moving the ramp any distance, a tow bar is supplied for attaching to lorries.

The Bonnie Bafflette

DESPITE rising costs and the increasing shortage of materials RICHARD ALLAN RADIO LTD., Taylor Street, Batley, Yorks, have been able to introduce to the home market the new "Bonnie" Bafflette loudspeaker at a price which will be popular with dealers and consumers alike—it is 39s. 6d.



The Allan Bafflette family portrait, with the Major, Minor, Baby and Bonnie

A robust 5 in. loudspeaker with a maximum input of 1·5 watts has a centrepole in Alcomax II covered by a pressed steel cup. The whole assembly is dustproof. Constant impedance volume control and flex are fitted.

The semi-baffle type cabinet peculiar to the Bafflette range is continued in the new model. Its dimensions are 8¼ in. x 6¾ in. x 3 in. The Bonnie Bafflette is available with a transformer at an additional cost of 8s. 6d.

A 4 in. Tube Bending Machine

FOLLOWING on the successful introduction of the 2 in. "Staffa" motorised hydraulic tube bending machine (March 8, 1951 issue ELECTRICAL TIMES) by CHAMBERLAIN INDUSTRIES LTD., Staffa Works, Leyton, E.10, the company has introduced more fully their larger 4 in. bending machine. This has the same design features and available power as the 2 in. model but a larger forming head allows the bending of cold and unloaded steel

Power bending for 4 in. conduits

tubes from ¾ in. to 4 in. to B.S. 1387/1947, and also ¾ in. to 2 in. electrical conduit tubing whilst with an easily fitted attachment it will bend flat m.s. bars up to 7 in. by ¾ in. section.

No hydraulic accumulator or air line is required as the pump, in the motorised version a Beacham H.P. swash plate pump driven by a ½ h.p. s.ph. a.c. motor or 400/440V 3-ph. motor, is mounted in its own reservoir of specially selected Shell "Tellus" 27 hydraulic oil.

TRADE PUBLICATIONS

DISTRIBUTION GEAR.—A new publication issued by British Insulated Callender's Cables, Ltd., Norfolk House, Norfolk Street, London, W.C.2, deals with the Terminal Boxes for telephone and auxiliary circuits.

TRACTION.—English Electric Co., Ltd., of Queens House, Kingsway, W.C.2, have for some time now been noted as specialists in the field of diesel-electric traction. A brochure on diesel-electric locomotives has recently been published by the company.

FLAMEPROOF GEAR.—New flameproof equipment price lists have been published by Simplex Electric Co., Ltd., Oldbury, Birmingham.

LIGHTING.—The new season's lamp and lighting catalogue has now been issued by Ekco-Ensign Electric, Ltd., 5 Vigo Street, W.1.

PUMPING.—The range of hydraulic pumps for aircraft installation made by the Plessey Co., Ltd., Ilford, Essex, is surveyed in an attractive brochure published by the company.

CENTRIFUGES.—The recent issue of Sharples Bulletin describes a wide range of British-built centrifuges supplied by Sharples Centrifuges, Ltd., Woodchester, Stroud, Glos.

ELECTRICAL EQUIPMENT.—"Philips in the Service of Industry," a brochure recently published by Philips Electrical, Ltd., Century House, Shaftesbury Avenue, W.C.2, is an introduction to the work of Philips and the many ways in which they serve industry.

LAMPS and LIGHTING.—The new season's catalogues of Osram filament, fluorescent and projector lamps have been issued by the General Electric Co., Ltd., Magnet Hse., Kingsway, W.C.2.

THE WEEK

COMMERCE *in news* INDUSTRY

Exports to Argentina

INFORMATION has been received by the Board of Trade concerning two circulars issued by the Argentine Central Bank specifying the commodities for which the Bank will consider applications for prior exchange permits for imports from this country. The advice was communicated by telegram and follows discussions last September of the Mixed Consultative Committee on Anglo-Argentine trade. Imports concerned include electrical and radio cables, materials and apparatus; meters; tools; accessories for lamps and clocks. Applications for import licences of these goods should be lodged by December 10. As soon as full details have been received an announcement will be made in the *Board of Trade Journal*.

B.E.A. Borrowings Up Again

A FURTHER statement of guarantee given by the Treasury on October 18 was issued last week, replacing that given on September 12. The guarantee in respect of temporary borrowings by the B.E.A. from clearing banks and Scottish banks up to December 31 amounts to a sum not exceeding £100 million. Previous amount involved was £80 million.

Engineering Congress in Stockholm

IT was announced recently that the fourth International Mechanical Engineering Congress will be held in Stockholm next year between June 4 and 10. The Congress is organised by the Trade Associations serving the mechanical engineering industry of 12 European countries—almost all those on this side of the Iron Curtain. The sponsoring organisation in Great Britain is the British Engineers' Association, 32 Victoria Street, S.W.1, from whom further information can be obtained.

Experts on Safety

SAFETY in the use of electricity in industry was the subject of a course held this year at the Burton Manor College for Adult Education. Such was the success of the course that arrangements have now been made for a repeat course early next year. This will be divided into two sections, the first (April 27 to May 1, 1952) for chartered electrical engineers and university graduates, and the second (June 23 to June 26, 1952) for foremen and similar staff, the lectures being of a less theoretical nature.

Lecturers will include H.M. Electrical Inspectors of Factories, Professor Meek (Liverpool), Prof. Williams (University College, Bangor) and Prof. Stefan Jellinek. This last expert, who is director of the Electrical Accident Museum in Vienna, will deliver the principal lecture on a day devoted to the effects of electricity on human beings. Since accommodation at the courses is limited, early application for details should be made to Dr. A. M. Brown, Burton Manor College, Burton-in-Wirral, Cheshire.

South Bank Auction Sale

THE Festival of Britain authorities announced last weekend that the auction sale at the South Bank exhibition site will take place on December 11 and 12 at 10.30 a.m. At the present time a catalogue of stock available has not been compiled, but we understand that electrical items on sale will include much of the equipment used in installations on the site, with the exception of plant. The majority will undoubtedly comprise lamps and lighting fittings—spotlights, reflector types and underwater lights—with some miscellaneous items such as switches and junction boxes. Work on the compilation of the catalogue is expected to begin almost at once and may be obtained on application only to Harold Williams and Partners, 80 High St., Croydon.

Traction at 50 c/s

BRITISH Railways are to experiment with single-phase traction at 50 c/s on the Lancaster-Morecambe-Heysham line. This particular section was first electrified at 6·6 kV, 25 c/s, in 1908, and the original equipment has now become obsolete. By arrangement with the principal manufacturers of traction equipment, various methods and types of equipment will be tried out, and arrangements are to be made so that the o.h. line voltage may be

The First Half-Century

It is pleasant to learn on the authority of Mr. William Forbes, that the London, Brighton and South Coast Railway Co. will be wide awake. As a season ticket holder on that line I have often longed for something to wake it up, especially when there are fogs about. It is also pleasant for the shareholders that the appointment of Major Cardew and Mr. Philip Dawson as consulting electrical engineers to the company has sent up the price of shares, but Mr. Forbes manages to make it quite clear that there is no immediate intention even of considering the electrification of the line.—*From our issue of November* 21, 1901.

varied from 6·6 kV up to and including 20 kV.

In the B.T.C. Report, this system was suggested as possibly suitable for secondary lines, the 1,500 V d.c. system being recommended for main line use. As the result of recent advances in technical development, however, it is thought that the h.v. 50 c/s system may have a wider field of economic application. This will depend on the experience gained on the experimental line.

Rural Wales wants Electricity

A RESOLUTION was passed at the 50th annual conference of Welsh Agricultural Organisation Society, asking all Welsh M.P.s to urge the Government to set aside a sum of money especially for the electrification of rural areas in Wales. Delegates expressed concern over the lack of electricity supplies and the discouraging outlook for the future in view of capital limitations. Because of the absence of these amenities, it was stated, not only was the younger generation, badly needed for agriculture, migrating to industrial areas, but the farmer was severely handicapped in his work.

Manufacturers see Permali Film

DESIGNERS and engineers representing electrical and textile machinery manufacturers of Lancashire with officials of the B.E.A. and N.C.B. were present last week at two showings of Permali Ltd.'s film *Strength Where You Need It*. Altogether over 250 guests saw the 35-minute documentary describing the manufacture and application of wood laminates. It was made originally 15 months ago to demonstrate the possibilities of Permali to the N. American market, and it is significant that in that time subsidiary companies had been formed and were operating in both the U.S. and Canada. Managing director Mr. A. A. Heath told guests that the company was erecting new works, including one at Morecambe. Future showings had been arranged for various centres.

A group at the reception following the Permali film performance showing from left to right F. W. Gee and F. W. Taylor (Ferranti), J. Bradshaw (Long and Crawford), A. J. Grey (Ferranti), H. Holmes and G. W. Davidson (Metrovick), A. A. Heath (Permali) and P. Thornhill (Metrovick)

OFFICIAL PUBLICATIONS

CENSUS OF PRODUCTION. FINAL REPORTS FOR 1948, VOL. 4. H.M.S.O., 2s. each

Trade L, *Electric Wires and Cables*, and Trade O, *Electric Lighting Accessories and Fittings*. (*See page* 936)

FUEL RESEARCH BOARD. H.M.S.O., 3s.

Report compiled by D.S.I.R., with the report of the director of Fuel Research, between April 1, 1946, *to March* 31, 1949. (*See page* 929)

RADIO FOR MERCHANT SHIPS. H.M.S.O. (gratis)

Amendments concerning performance of medium-wave and emergency radio-telegraph sender.

BRITISH STANDARDS INSTITUTION.

*Amendment slips PD*1267 *(to B.S.* 1650, *Part I —Industrial Capacitors) and PD*1269 *(to B.S.* 555, *Tungsten Filament Lamps).*

INSTITUTION OF ELECTRICAL ENGINEERS: ABRIDGED WIRING REGULATIONS. Price 2s. 6d. (*See page* 923.)

ANGLO-AMERICAN COUNCIL ON PRODUCTIVITY.

Reports on Universities and Industry (2s. 6d.); *Education for Management* (4s. 6d.); *and Saving Scarce Metals* (2s.). (*See page* 930.)

HYDRO-ELECTRIC DEPARTMENT (SCOTLAND) BILL. H.M.S.O., 3d.

Bill to extend borrowing powers of N. of Scotland H.-E. Board. (*See page* 956.)

PUBLIC WORKS LOANS BILL. H.M.S.O., 2d.

STATEMENT OF GUARANTEE BY TREASURY. H.M.S.O., 2d.

Guarantee in respect of B.E.A. borrowings (*See page* 951.)

Copper Extraction

THE importance of copper in this modern world can hardly be over-estimated, yet due to the fact that all copper is mined abroad, comparatively little literature—apart from specialised text-books—is available on the general processing of copper. In response, therefore, to many requests from teachers in technical schools, science masters, and students generally, the Copper Development Association, Kendals Hall, Radlett, Herts, have produced a small booklet entitled "Copper—Its Ores, Mining and Extraction." This covers, in remarkable detail for such a small volume, the complete processing of copper from the raw material to the refined bar. Copies of this book are available, free of charge or obligation, to those people giving evidence of responsible status or genuine interest.

Science in 1851

SCIENTIFIC knowledge prevalent in the middle of the nineteenth century, the accumulation of that knowledge during preceding generations and its immediate results were outlined in a paper entitled "The Status of Science in 1851," delivered by Sir Henry Self to the Birmingham Electric Club on Monday last. The three previous centuries had witnessed such progress that Sir Henry found ample subject matter to discourse at length.

Approaching the wide subject methodically, he divided his talk into six main sections. He dealt first with mathematics and passing to physics, subdivided that title to speak of light, heat, the conservation of energy, electro-magnetism and spectrum analysis. Sir Henry then spoke of the re-birth of chemistry, the claims of biology, which he again subdivided, and finally Whevells' Philosophy of Science.

Uniform Street Lighting

DELEGATES of Yorkshire Accident Prevention Federation urged the establishment of a uniform standard of street lighting throughout the country at their quarterly meeting in York recently. Representatives of over 80 road safety committees were present at the meeting which decided to forward the suggestion for discussion at the open forum of the 1952 National Road Safety Congress in London.

Showcards for Control Units

SALES-AIDS in the form of cut-outs to be affixed to their range of indicating control units have been prepared by Arrow Electric Switches, Ltd. Appropriately they take the form of an arrow in red and blue with white lettering and fit on to units as shown in our accompanying illustration. Two types are available, one for the tumbler unit and another for the horizontal rotary pattern, and should prove useful for showroom, window or counter displays. Wholesalers and distributors can obtain this material from the manufacturers at Hanger Lane, Ealing, W.5.

Cut-out affixed to Arrow tumbler control unit

The Seven "Ms" in Industry

THE autumn conference of the British Institute of Management took place last week at Harrogate. It was opened on Thursday by Sir Clive Baillieu who gave delegates a brief historical background and review of achievements gained by B.I.M. in the immediate past. It was up to managers, he said, to provide the goods and services required by the country for its own consumption, for export and for rearmament.

Another speaker at the conference was Lord Verulam, chairman and managing director of Enfield Cables Ltd. He said the complex organisation of the country involved the seven "ms"—men, materials, money, machines, methods, markets and management—and it was well to remember this while growing forward and facing the future constructively. He suggested an authoritative study into the size of the working unit in British industry, and added that we must be prepared to move parts of industries and personnel to the "open spaces" of the Commonwealth.

B.T.H. Equipment in the "Aureol"

THE new luxury liner, M.V. *Aureol*, 14,000 tons, has been equipped throughout with fluorescent lighting by the British Thomson-Houston Co. The majority of fittings are Mazda F.1020 4 ft and 6 ft channels, and most of these are of the cornice type designed to fit into the sides of shallow deckhead recesses. Others have been designed for mounting in soffits. In the first class dining saloon where the deckhead across the full width of the ship is split into three sections, cornice type 4 ft fittings are used in recesses of both side sections. The central section has been lit by bare-lamp fluorescent channels concealed in a cornice and three inverted mushroom-type fittings housing tungsten lamps. These provide decorative effects to the overall lighting scheme. Although fluorescent lighting provides the main source of illumination, tungsten lamps and fittings have been added in some places to enhance the effect.

Firm's new Swedish Agents

FOLLOWING the visit of their export manager, Mr. A. G. H. Pritchett, to the St. Eriks Massan at Stockholm, Chamberlain Industries Ltd. have announced the appointment of two agents in Sweden. The southern section of the country which includes a number of large water works and electricity undertakings will be the province of Messrs. Sigma A. B., Drottningalten 150, Halsingborg, while north of the Gothenburg-Vastervik railway line the agent will be Messrs. Sven Fagrell, A.B., Polhemsgatan 14, Solna 1, Stockholm. These bring the number of the company's overseas agents up to 23.

Fluorescent lighting provided by the British Thomson-Houston Co., Ltd., in the first-class dining saloon aboard M.V. "Aureol"

Joan Robins talking to H. G. F. Gamble of the Eastern Board and vice-chairman of E.D.A.'s Domestic Appliances Committee during one of a series of T.V. programmes demonstrating the ease with which housewives can do their washing nowadays. This programme was on Thursday last week

Board Officials can force Entry

The Court of Appeal has upheld the previous decision in a lower court that a gas board official has the right to force an entry into a house to obtain access to the meter. It dismissed an appeal of a company director who failed in his claim against the Eastern Gas Board for damages for trespass and wrongful entry. He had complained that an inspector removed a pane of glass and forced his way into the house. The Board maintained they acted within the scope of the Gas Act, 1948, and that it was an implied term in the supply of gas that they should be given access to the meter. Leave to appeal to the House of Lords was refused.

Welding Structural Steels

A RECENT publication of the British Welding Research Association is a report on the control of cracking in the metal arc welding of structural steels. The type of failure considered is that known as hard zone cracking, and the research reported attacked the problem by correlating cooling rate and the occurrence and extent of cracking. It was found that a critical cooling rate existed for each type of electrode when it was used to weld a given steel. Incidental to the report of the research, a new weldability test for structural steels is described. The address of the B.W.R.A., from whom further particulars can be obtained, is 29 Park Crescent, London W.1.

Gifts for E.I.B.A. Home

WE HEAR that a number of welcome gifts have been given to the E.I.B.A. for the benefit of residents at the Association's home at Broome Park, Betchworth. All the gifts, with one exception, are for the workshop, and include a motor from Brook Motors, two large selections of tools from A. E. Dees Ltd. and T. Smith, Rowe Bros. and Co., two gripper hand lamps from G. H. E. Conradi, British Central Electrical Co., Wolf flexible shaft grinder from J. W. Terry, E.M.F. (Electrical), calipers and drills from C. J. Margerison, Wholesale Electric Co., 15 yd of cable from J. E. Sunderland, Enfield Cables, and a utility drill from Mr. Corbett, Newey and Eyre. A billard table for the house was donated by R. E. V. Ely, Foster Electrical Supplies Ltd.

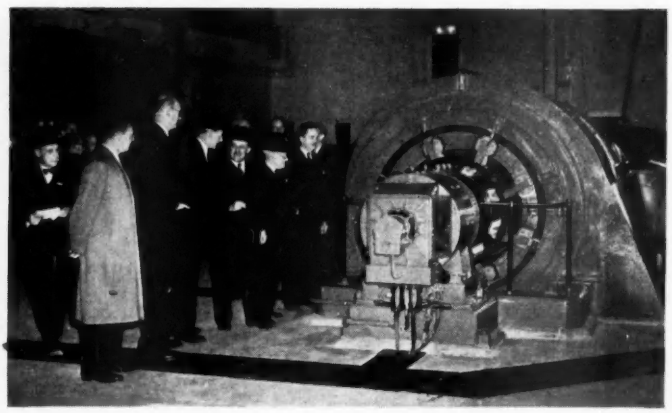
Advantages of Electric Vehicles

THE advantages of battery-electric vehicles for short journeys and frequent stops for delivery and collection are outlined in a small and well-illustrated brochure just issued by the Electric Vehicle Association of G.B. Illustrations show examples of the various types of vehicles and many of their uses. Copies of this pamphlet may be obtained from the Association at 2 Savoy Hill, W.C.2.

Siemens' Long Service Awards

FOLLOWING a suggestion from employees' representatives and the firm's Co-operation Committee, Siemens Bros. and Co., Ltd. recently presented long service certificates to 95 members of the staff who had completed 40 years or more with the company. The presentation was made by the chairman, Sir Hubert de la Poer Gough.

Personalities who attended the opening of the G.E.C.'s new heavy engineering works at Witton, featured in our last week's issue. From left to right are A. Morgan, Cardiff branch, G.E.C.; T. W. Heather, sales director, Sir Henry Self, vice-chairman, B.E.A.; R. A. Riddles, chief mechanical and electrical engineer, B.R.; Sir Harry Railing, chairman, G.E.C.; Dr. C. C. Garrard, director and A. M. Anderson



E.A.W. Celebrations

THE Cheltenham branch of E.A.W. earlier this month became the fourth to celebrate its silver jubilee. The event was marked by a special luncheon at the Queen's Hotel, the highlight of which was the presentation of a cheque for £100 to Dame Caroline Haslett, E.A.W. director, to constitute the branch's silver jubilee awards. This is to be given annually in £5, £3 and £2 prizes to housewives gaining highest marks in the Association's Home Workers' Certificate tests.

A few days earlier Dame Caroline was in Blackpool to inaugurate another branch there, the 112th in the Association. Mrs. F. I. Nickson, chairman, presided and other speakers included Mr. Ellis, president, Blackpool branch of E.C.A., and Mr. G. A. Robertson, Preston sub-area manager of N.W.E.B. A third celebration took place at Torquay a short time ago when the local branch there came of age. The director was also present at this function, as also were the Mayor, Mrs. V. F. Gresham, branch president and Mr. S. F. Steward, chairman of S.W.E.B.

Submarine Cable Stolen

A LOSS of some £85,000 has been sustained as a result of the theft of large portions of the submarine cable linking Germany with the island of Heligoland. Metal collectors have apparently been cutting portions of the 40-mile cable for several years and selling them to scrap dealers. At least two fishing boats have been caught loaded with metal which obviously came from the Heligoland cable. The island has been uninhabited since the war while used as a bombing target, and is due to be returned to Germany next year. A new cable will probably have to be laid.

NEWS IN BRIEF

H.R.H. the Duke of Edinburgh will tour the works of C. A. Parsons and Co., Ltd., and Sir Howard Grubb Parsons and Co., Ltd., while on his official visit to Newcastle on November 28.

Mr. R. H. Fawcett, managing director of Edward Holme and Co. (1931), Ltd., Altrincham, has the welfare of his employees at heart. Free insurance against personal accident and injury is provided for all members of the firm's social club.

E. Midlands Electricity Board is holding a series of one-day courses at Leicester this month for junior staff employed at service centres.

Dorman and Smith Ltd. are to give demonstrations of the Dorman Miniature Circuit-breaker at St. Ermin's Hotel, S.W.1, on November 26 and 27. Those interested should apply for tickets to the company at 10 Emerald Street, W.C.1.

The Daily Mail Ideal Home Exhibition of 1952 will be held at Olympia from March 4 to 29.

We hear that John F. McKee, Ardmore, has been awarded a Certificate of Merit by the Franklin Institute, Philadelphia, for his development of a small light-weight steam trap known as Yarway. Commonwealth and European rights are vested in Dewrance and Co. Ltd.

The F.B.I., in its latest booklet "Fuel Economy Pays" (price 2s.) advises industry on how it can avoid waste in the use of fuel, and at the same time make substantial economies in costs. Three sections deal with common faults in boiler operation, use of instruments for measurement and control and efficient use of heat.

The sixth annual report of the Council of Industrial Design was published last weekend. It contains a brief account of contributions to the Festival and other sections deal methodically with the Council's regular services.

As a guide to possible usage of electricity, the Meteorological Office is to supply countrywide weather forecasts to the B.E.A.

Messrs. Johnson & Phillips Ltd., have asked us to point out that the condenser, transformer and rectifier tanks in their impulse generator (described in our issue of November 1) are made of Paxolin and not Bakelite as stated.

Questions in Parliament

Black Market Steel

Questioned concerning alleged black market sales of steel in the north-east, the Minister of Supply said there was growing evidence of such illegal transactions throughout the country, including the north-eastern counties. Two convictions had been obtained the previous week, two other prosecutions were pending and an additional 35 cases were being examined by Ministry investigators.

Coal Gasification

Experiments in the underground gasification of coal were continuing at Newman Spinney, stated Mr. Geoffrey Lloyd in a written answer last week. Preparations were also being made to conduct similar research at Bayton, Worcestershire, where conditions were slightly different. The experiments were on a relatively small scale and designed to discover whether full-scale operations should be planned.

Cost of TV Stations

Questions were put to the assistant Postmaster-General, Mr. David Gammans, concerning the progress being made with the television stations at Wenvoe, Pontop Pike and Kirk o' Shotts. Replying, Mr. Gammans said work at Wenvoe was proceeding according to schedule, but it was too early to say whether or not it would be ready by mid-1952 as planned. The laying of cable was almost complete and the equipment being installed. Although the cable would not be ready for service until November, 1952, a temporary

radio link should be effective by the middle of next year. He added that all orders for equipment had been placed and that the estimated cost of Wenvoe was £330,000.

Mr. Gammans, answering further questions, stated the estimated cost of the P.O. relay station at Pontop Pike was about £60,000, and the cost of Pontop Pike itself between £150,000 and £200,000. It was not possible to say when work would be started. In regard to Kirk o' Shotts, Mr. Gammans said the estimated cost of the radio television link between Manchester and Kirk o' Shotts was £520,000; cable was not being used.

Electricity Supply to Houses

Mr. Harold Macmillan stated that work was proceeding on 773 houses under the Newcastle Council's five-year scheme to provide pre-war houses with electricity, although he understood that the N.E. Electricity Board were unable to do more at present due to limited resources available.

Fires should have Guards

Mr. Blenkinsop asked the Minister of Works whether steps could be taken to ensure that all electric fires were fitted with adequate protective guards. He was told in a written answer that guards were included in the B.S.I. specifications, and manufacturers' associations had promised to urge their members to observe those specifications.

H.E. Board Borrowings

The Hydro-Electric Development (Scotland) Bill, to extend the borrowing powers of the N. of Scotland H.E. Board, was read a first and second time in the House last week. It provides for the increase of borrowing power from £100 million to £200 million.

Lead Thefts

In view of increased thefts of lead, could action be taken to ensure that scrap merchants purchased scrap lead from registered users and a record be kept of all transactions, asked Mr. H. Boardman. The Minister said he had considered the suggestion, but found the registration of users would be impracticable.

P.T. to Stay

In the present economic situation there was no early prospect of abolishing purchase tax, stated Mr. R. A. Butler in a written answer.

Safety of Milking Machines

The Minister of Agriculture was asked if he would introduce legislation to prevent accidents arising from the faulty use of electric milking machines. Sir T. Dugdale said only one such accident had been reported. He did not think further regulations were needed, as Electricity Boards already required any installation to comply with certain safety standards.

Statement on B.B.C. Charter

The Prime Minister was asked for information as to conditions under which the B.B.C. Charter and licences will be issued on their expiration at the end of this year. Replying, Mr. Churchill said a statement would be made shortly.

Steel Costs in Rearmament

In a written answer last week, the Minister of Supply said that as a result of the increase in steel prices approved last August, cost of steel used directly in the rearmament programme would be raised by some £20 million. The higher prices would also increase the cost of machine tools and plant used to make defence equipment.

Stopping-Up Highways

In the course of the debate on the Defence Regulations on Wednesday last, Mr. Hale had some comments to make on Regulation 16 which provides for the stopping-up or diversion of highways in order to work opencast coal or construct generating stations. He referred to an attack on the clause made some months ago by the present Solicitor-General and an explanation given by the then Minister of Fuel and Power, who asserted that the regulation would be used for one generating station only. Mr. Hale asked what the position was now; did the Government intend to withdraw past attacks and keep the regulation for opencast coal operations, or would they say they did not want the regulation for coal operations, and, although it was not required for any generating stations, would still like to retain it?

The Parliamentary Secretary to the Ministry of Fuel and Power replying, stated that so far as new power stations were concerned, the regulation could be done away with, but it would have to be retained for opencast coal working due to the present grim situation in regard to coal supplies. In view of this explanation Mr. Hale withdrew his amendment for the exclusion of the relevant clause.

Supplies of Steel Scrap

Mr. Duncan Sandys told the House that though the supply of scrap for the steel industry was primarily a matter for the industry itself, he understood the Iron and Steel Federation was continuing its drive to collect scrap and was importing as much as possible. They had also strengthened their foreign buying arrangements. Referring to imports from Germany, he said these had decreased considerably as war scrap was coming to an end.

Supply to Rural Area

The question of an electricity supply to Borrowdale in the Lake District was raised on the adjournment. A scheme for the district had been prepared some 14 years ago and aroused some controversy on the amenity issue, it was stated. The valley, which was also a tourist centre, needed a supply to hotels, farms and homes. Mr. L. W. Joynson-Hicks replied by pointing out the difficulties involved—the limitation of capital expenditure, the small and possibly unprofitable community involved, the competing claims of other areas and the expense of overhead lines, even if they were acceptable. Though the Ministry sympathised, they could hold out little hope at present for such a scheme. In any case, the decision rested with the appropriate Board, he said.

Electric Supply News

Eire

Last Thursday, the electricity ration to consumers was increased to 100% the Electricity Supply Board has announced, Although economy is still essential, consumers may now use the same amount as last year.

Fife

A proposal for Fife County Council to use water of the new reservoir under construction at Upper Glendevon, Perthshire, for generating electricity, has been agreed to in principle by the Fife Water Supplies Committee. The county engineer Mr. C. Huddleston, estimates that 1½-million units a year could be generated under the scheme. Reporting to the committee, he said that as the result of informal talks with the North of Scotland Hydro-Electric Board, he understood that the Board would have no objection to Fife County Council's developing the water power, and that the Board would be willing to purchase the energy developed if it were delivered into their transmission line which was about to be constructed from Yetts of Muckhart along Glendevon. The average income from the sale would be not less than £2,000. One or two generators of about 600 kW would be required. The scheme has been remitted for further investigation.

Lanarkshire

It is cheaper to install their own hydro-electric plant for supplying electricity to houses and buildings at Camps Reservoir, than to obtain a supply from the South West Scotland Electricity Board, the Lanarkshire County Council's Water Committee has decided. The Electricity Board would have to erect about 4 miles of h.t. line, costing £4,000, and asked the County Council to contribute £3,000. In addition, the Council would have to erect at its own expense, feeder and subsidiary lines costing £645. The Board pointed out that the planned development of the area was not scheduled to begin until 1956; if the Council could wait till then, the quotation would be much lower. The Council's Water Committee has decided to go ahead with the installation of an 18 kW hydro-electric plant operated by compensation water. This it is estimated, will cost £3,232.

Lancashire

An inquiry may be held into the North Western Electricity Board's scheme to supply current by overhead cable to some twenty farmsteads on the Abbeystead estate in Over Wyresdale just below the Trough of Bowland. The Lancashire County Planning Committee has approved the scheme with the provision that 670 yards of the line (out of a total of about nine miles) should be laid underground. The Board, however, has refused to accept this proviso and has referred the matter to the Minstry of Fuel and Power. The Lancashire-branch of the C.P.R.E., offered £100 towards the £600 extra cost of putting the cable underground.

Malvern

The National Trust was last week granted an interim injunction to restrain the Midlands Electricity Board from erecting an o.h. line over part of the Malvern Hills (we noted last week that the Trust had applied for a writ). Mr. Justice Harman directed that there should be a speedy trial of the action, the Board giving an undertaking not to proceed with their work on the specified section of the line meanwhile.

Northern Ireland

Charges to consumers will be raised by the Electricity Board for Northern Ireland as from the first billing period next year. The flat rate for lighting is increased by 1¼d. to 9¼d.; where heating and cooking consumption is under 100 units p.q. the rise is from 1½d. to 2·1d., and over 100 units the rate goes from 1d. to 1 6d. p.u. The floor area fixed charge is increased from £1 11s. 3d. to £1 14s. 4d. in houses under 500 sq. ft., and from £3 2s. 6d. to £3 8s. 8d. up to 1,000 sq. ft. The first 500 units will cost 1·3d. instead of ¾d. per unit, while, where over 500 units p.q. are used, the rise is from ½d. to 1d. Shop window lighting charges will rise from 2d. to 2¾d. p.u.

North of Scotland

The North of Scotland Hydro-Electric Board were not living up to the promises made to the people of the Highlands, declared Mr. Frank I. Stuart, Firthside, Lossiemouth, at Elgin, recently, when presiding at a meeting of Moray and Nairn Electricity Consultative Committee. He wanted to know why service charges for the installation of electricity were being made after a promise had been given that every hamlet and croft in the Highlands would have the chance of cheap electricity. Mr. A. Clerk, area supervisor for the Board, said the difficulty was that the Board had to balance its budget. He agreed that it had been the declared intention when the Board were formed in 1943 to connect consumers without charge, provided they were within reasonable distance. Since that time, however, costs had increased greatly, and he instanced the case of o.h. lines now costing £1,200 per mile, compared with £400. They had either to slow down the rate of distribution to new consumers, or raise existing tariffs to give free connections. He contended that new consumers in outlying areas should be asked to make some contribution for connection.

North Wales

Interested parties have been notified by the B.E.A. that they will seek Parliamentary sanction in the present session to proceed with three of the eight hydro-electric schemes for North Wales. (It should be made clear that the five other more contentious schemes have not been abandoned.) The Authority wishes to commence with extensions to the water catchment area at Dolgarrog and Maentwrog, which, with additional plant at Dolgarrog, should provide about one sixth of the extra power planned from the whole eight schemes. Of the six new ones, only that for Ffestinog will be included in the Bill. It is hoped to have the two extensions schemes ready in 1954 and the Ffestinog works in 1955.

LIGHTING SCHEMES

Bexhill.—The local Chamber of Commerce has suggested improved decorative lighting along the promenade.

Bootle.—The T. C. is recommended to approve the provision of sodium lighting in Stanley Road, Strand Road, Knowsley Road and Primrose Road at a total cost of £6,955.

Burnley.—The Street Lighting-Sub-committee has approved a scheme for the installation of sodium lighting in Accrington Road next year.

Chaddesden.—Told that the M.o.T. would not approve a £6,400 lighting scheme, the parish council has submitted a revised scheme to cost £1,540.

Goole.—T.C. preparing scheme for electric lighting of Hook Road and Swinefleet Road.

Poulton.—The U.D.C. has received consent to borrow £1,300 for 38 street lamps.

Seaford (Sussex).—The U.D.C. has approved in principle a scheme for lighting of the seafront from Pelham Road to Claremont Road.

Company Activities

Birmid Industries

The group profit, after all charges including taxation, was £848,525 (*£462,314*). This figure was struck after charging £954,924 for U.K. taxation, including £44,713 (*£53,354*) tax equalisation account in respect of initial allowances. The dividend is increased from 10% to 15% and the bonus 10% is maintained, making 25% (*20%*). The sum of £220,307 (*£212,000*) is placed to capital reserve for replacement of fixed assets, £186,000 (*£75,000*) to stock reserve, £25,000 (*£30,000*) to general reserve, £27,000 (*nil*) to pension scheme, and £25,000 (*nil*) to dividend equalisation reserve.

Burco Ltd.

In his statement accompanying the full report, Mr. D. K. Ward, chairman and managing director, indicates that the new all-electric washing machine has been well received abroad—75% of total production is exported. The directors have considered the reorganisation of the capital whereby some capitalisation of the reserves in a bonus issue would bring the issued capital more into line with what is used in the business. But the directors feel that present uncertainties must be clarified before they can proceed with that matter.

Crabtree Electrical Industries Ltd.

In the full report, the directors draw attention to the fact that the year ended July 31 last, was a record in the company's history both from the point of view of sales and of profit. The company's financial position has also been further strengthened. Fixed asset are listed at £717,992 (*£729,903*) and current assets at £1,260,994 (*£1,063,954*). Current liabilities and provisions amount to £310,147 (*£255,141*), and there are commitments for expenditure on capital equipment in course of construction of £19,008 (*£7,120*), and a contingent liability in respect of uncalled capital in the South African subsidiary of £28,494 (*same*).

Richard Johnson & Nephew

Permission of the Treasury, through the C.I.C., has been obtained to an increase on the issued capital, by the capitalisation of £900,000 of reserves and its distribution in Ordinary shares in the proportion of one for every three held.

Morphy-Richards

In order to equip and work the new factory the company would need a further £75,000 of capital, the chairman stated last week. The directors propose to redeem the outstanding £75,000 5% Unsecured Notes (which are at present repayable in 1955) on March 31 next at a price of 104%, and to replace them by capital of a more permanent nature. It is intended, therefore, to create and offer to existing shareholders 130,000 6% Redeemable Cumulative Convertible Preference £1 shares and 55,000 Ordinary 4s. shares, the latter at a premium to be settled. The consent of the C.I.C. has been obtained to the proposed issue. The directors admit that owing to profits tax, the annual cost of capital raised in Preference form is rather more expensive than note capital, the burden falling entirely on Ordinary shareholders. But they feel it better "to pay this expensive, but not prohibitive fine for the sake of achieving a sound capital structure."

Stream-Line Filters Ltd.

The net profit for 1950, was £37,357 (*£9,647*), after charging taxation, depreciation etc. of £74,828 (*£32,635*). The dividend, already paid, was 15% (*12½%*). The sum of £49,313 is carried forward.

Yarrow & Co.

For the year to June 30 last, the group profit, after charging taxation and providing £50,000 for obsolescence, etc., is £87,516 (*£83,048*). Taxation takes £185,500 (*£120,000*). The dividend is 15%, less tax on doubled capital, compared with 15% tax free on smaller capital for the previous year.

Dividends Declared

Enfield Cables—Interim dividend of 3¾% (*same*).

Joseph Lucas.—Final Ordinary dividend of 5 5/16% (*5%*).

Senior Economisers.—Interim dividend of 30% (*same*).

S. Smith and Sons (England) Ltd.—Final Ordinary dividend of 10%, making 12½% on enlarged capital.

Telephone Manufacturing Co.—Interim of 2½% (*same*).

Ward and Goldstone.—Interim dividend of 20% (*same*) on increased capital.

Commercial Information

CONTRACTS OPEN

HOME

Nov. 24.—Glyncorrwg U.D.C. Wiring of 86 houses at Cymmer. Engineer and Surveyor, T. J. Walker, Council Offices, Cymmer. Deposit £1 1s.

Nov. 24.—Holmfirth (Yorks) U.D.C. Electrical work in erection of 14 houses at Brockholes. Architects: Stocks, Sykes and Hickson, 4 St. Peter's St., Huddersfield.

Nov. 24.—Lewisham. Supply of 50 columns for street lighting on Group A roads. Borough Engineer, Lewisham Town Hall, Catford, S.E.6.

Nov. 26.—Dewsbury T.C. Electrical installation in Bank Top secondary school. Borough Architect and Buildings Surveyor, Town Hall. Deposit £3.

Nov. 26.—N. Ireland. Electrical work on 166 houses at Hilden for N. Ireland Housing Trust, Trust Offices, 12 Hope Street, Belfast. Deposit 10s.

Nov. 26.—Worcester. Electrical heating at Rainbow Hill infants' school and Comer Gardens junior school. City Engineer and Surveyors Dept., 22 Bridge St. Deposit £2 2s.

Nov. 28.—Hertfordshire. Maintenance of refrigerators, etc., in schools. Apply to Central Purchasing Officer, The Old Rectory, Hatfield.

Nov. 28.—Inverness. Electrical work in house at Craig Dunain Hospital. Alexander Ross and Son, Chartered Architects, 28 Queensgate.

Nov. 28.—Nottinghamshire. Names invited to be placed on schedule of contractors for electrical work to be carried out as from Jan. 1. K. Tweedale Meaby, Shire Hall.

Nov. 30. — Ashton-in-Makerfield U.D.C. Supply of 24 concrete columns, filament lighting lanterns and time switches. Surveyor, Town Hall.

Nov. 30.—Bristol. Supply of sundry electrical goods for year ending Dec. 31, 1952. Central Purchasing Dept., 2 Upper York St., St. Paul's, Bristol 2.

Nov. 30.—Salford. Supply of one 25-ft 3-section motor tower wagon mounted on ¾-ton Karrier C.K.3 low-loading chassis. Street Lighting Superintendent, Bloom St., Salford 3. (See October 18 issue.)

Dec. 1.—Hinckley (Leics. U.D.C. Supply and installation of (*a*) 180 concrete columns and (*b*) same number of lanterns, chokes, capacitors, all in Group A. Lighting Engineer, H. M. Etherington, 9 Station Rd. Deposit £2 2s. (See November 8 issue.)

Dec. 1.—Normanton (Yorks) U.D.C. Supply of equipment and erection of columns for lighting two miles of main road. Surveyor, Town Hall.

Dec. 1.—Southwick U.D.C. Installation of electricity in 20 houses and 16 flats and extension of existing installations in 12 houses and 18 flats. Engineer and Surveyor, Town Hall. Deposit £2 2s.

Dec. 5.—Saltcoats T.C. Electrical installation in erection of 58 houses on New England site. R. Rennie, architect, 12a Hamilton St.

Dec. 6.—Norton R.D.C. Electrical installation in 22 existing houses at Duggleby, nr. Malton. R. W. Clayton, Architect to Council, R.D.C. Offices, Welham Rd.

Dec. 12.—Monmouthshire. Eastern Valleys joint sewerage board invites tenders for eight sets of electrically driven vertical pumps with ancillary equipment. John Taylor and Sons, Artillery House, Westminster, S.W.1. Deposit £5.

Dec. 14.—Sheffield. Electrical installation at Eccleshall primary infants' school. W. Geo. Davies, City Architect, Town Hall. Deposit £2.

Dec. 17.—Darlington. Provision and erection of two electric motor and centrifugal pump sets, automatically controlled. Council's Consulting Engineer, Arnold Brooksbank, 14 The Exchange, Bradford. Deposit £2 2s.

Dec. 17.—Newcastle-on-Tyne. Electric lighting and power installation in Stocksfield Ave. primary school. Application by Nov. 26 to consulting engineers, R. W. Gregory and Partners. Deposit £5 5s. (See Nov. 15 issue.)

Dec. 31.—Staffordshire. Fire Brigade requires supply of electric headlamps. Chief Fire Officer, Brigade H.Q., Pirehill, Aston, Stone.

Jan. 1.—Stourbridge. Manufacture, supply and erection of electrically operated centrifugal pumping plant, including electric motors, switchgear, wiring, etc. Geo. P. Deeley, 13 Church St. Deposit £5 5s.

Jan. 4.—Belfast. Supply and erection of (a) one 7½-ton and one 5-ton overhead travelling crane, one electric lift (2,000 lb capacity), workshop machinery and equipment, self-contained transport weighbridge; and (b) lighting, heating and auxiliary power installation; for harbour power station. Merz and McLellan, consulting engineers, Carliol House, Newcastle-on-Tyne 1. Deposit £5 5s. each item. (Advertised in this issue.)

Jan. 4.—Belfast. Supply and erection of complete coal-handling plant for Victoria power station, including reclaiming transporter, conveyors, automatic weighers and all ancillary equipment. Merz and McLellan, consulting engineers, Carliol House, Newcastle-on-Tyne. Deposit £5 5s. (See Nov. 8 issue.)

Jan. 7.—Gateshead T.C. Electrical installation in stage 2 of new technical college. Applications to Chief Architect, H. J. Cook, Municipal Buildings, Swinburne St., by Nov. 29. Deposit £2 2s. (Advertised in this issue.)

Jan. 14.—Aireborough U.D.C. Supply and installation of (a) columns and brackets, and fitting and wiring of lanterns, and (b) supply of lanterns and all auxiliary gear; for 250 W mercury discharge lighting along 2¼ miles of Leeds Rd. Engineer and Surveyor, Council Offices, Micklefield House, Rawdon, nr. Leeds. Deposit £2 2s. (See Nov. 15 issue.)

Jan. 31.—Norwich. Supply and erection of two sets of electrically driven, vertical spindle, centrifugal foul sewer pumps and ancillary equipment. City Engineer City Hall. Deposit £5.

Feb. 1.—Ireland. Supply and erection of hydro-electric generating plant at Inniscarra and

Carrigadriod stations on River Lee. Documents from Chief Generation Engineer, Electricity Supply Board, 27 Lower Fitzwilliam St., Dublin C.18. Deposit £5 5s. (See Nov. 1 issue.)

Nov. 26.—Birtley (Durham) P.C. Supply and erection of 17 sodium lighting units. Clerk to Council, Stanley Hunt, Relief Office, Birtley.

Dec. 19.—Swindon T.C. Supply and installation of electric cabling, wiring, fittings and equipment for extensions to Rodbourne sewage works. Borough Surveyor, Civic Offices. Deposit £2. (Advertised in this issue.)

No date stated.—N. of Scotland H.E. Board. Supply and erection of approximately 47 miles of 22 kV, 10 miles of 11 kV and 30 miles of l.v. single-circuit wood pole overhead transmission and distribution lines in islands of Benbecula, S. Uist and Eriskay. Engineers, Merz and McLellan, 39 Northumberland St., Edinburgh 3. Deposit £1 1s. (Advertised in this issue.)

No date stated.—N of Scotland H.-E. Board. Supply and installation of approx. 350 yd of 132 kV cables for Invergarry power station. Kennedy and Donkin, 12 Caxton St., London, S.W.1. Deposit £2 2s. (See Nov. 15 issue.)

No date stated.—Brechin. Electrical work in erection of 30 houses in Springfield scheme. Wm. M. Patrick and Co., architects, 63 High St., Montrose.

No dates stated.—Midlothian. Electrical work in erection of blocks of 4 shops with accommodation above on three sites; County Architect, 32 Palmerston Place, Edinburgh 2. Also same in reconstruction of wards at Rosslynlee Mental Hospital; Secretary, Rosslynlee and Haddington Mental Hospitals Board of Management, 21 Hill St., Edinburgh 2. (Separate contracts.)

OVERSEAS

*Details of items marked * may be obtained on application to Room 1076, Board of Trade, Thames House, North Millbank, S.W.1, quoting reference.*

Dec. 10.—U.S.A. Tenders invited by U.N., Lake Success, New York, for paging and intercommunication system to operate from 110 V 60 c/s a.c. supply. B.o.T.(Ref.CRE(IB)75652/51).*

Dec. 13.—Australia. Manufacture, supply of protective relays for use on 132 kV and 66 kV systems, for Sydney C.C., Queen Victoria Buildings, George St., Sydney. B.o.T. (Ref. CRE(IB) 74873/51).* Also manufacture and supply of 33 kV neutral earthing resistors for substation at Homebush and Blacktown, for same. B.o.T. (Ref. CRE (IB) 74872/51).*

Dec. 19.—Portugal. Supply and erection of electro-mechanical equipment for pumping stations of Campilas and S. Domingos Valleys hydro-agricultural scheme. Directorate Generale of Hydraulic Services, 23 Rua de S. Mamede ao Caldas, Lisbon. (Deposit £3 10s.). B.o.T. (Ref. CRE (IB) 75641/51).*

Dec. 28.—Uruguay. Supply of armoured cable and accessories for Administracion Nacional de Combustibles Alcohol y Portland, Casilla de Correo 1090, Montevideo. B.o.T. (Ref. CRE (IB) 75486/51).*

Dec. 28.—Belgian Congo. Supply and erection of laundry equipment, including washing machines, driers, irons, etc. Ministère des Colonies, 14 Rue des Petits Carmes, Brussels B.o.T. (Ref. CRE (IB) 74547/51).*

Dec. 28.—Brazil. Tenders being invited for a lift bridge by Rio Grande de Sul State Railway Porto Alegre. Each of two porticos will be provided with electric motor, and all necessary equipment including switchgear is sought. B.o.T. (Ref. CRE (IB) 75441/51).*

Jan. 8.—New Zealand. Manufacture of two high pressure hydraulic pumping units and associated valves and electric components of lifting gear for sluice gate and intake gates of Whakamarn power project. Secretary, Box 8015, Govt. Buildings, G.P.O. Wellington. Documents available at N.Z. Govt. offices in London.

Jan. 8.—New Zealand. Supply of two high-pressure hydraulic pumping units with two squirrel cage-type electric motors. Ministry of Works, P.O. 8015, Government Buildings P.O., Wellington. B.o.T. (Ref. CRE (IB) 75342/51).*

Jan. 23.—Australia. Supply of two 2,000 kVA 6,600/66,000 V 3-phase 50 c/s step-up transformers for Burdekin River Authority. State Electricity Commission of Queensland, Scottish Union House, Eagle St., Brisbane. B.o.T. (Ref. CRE (IB) 75331/51).*

Jan. 30. Australia. State Electricity Commission of Queensland invites tenders for supply of steel-cored aluminium conductors and accessories. Commission is at Scottish Union House, Eagle St., Brisbane. B.o.T. (Ref. CRE (IB) 75293/51).*

Your Queries — Answered

Earthing clips to B.S. 951, makers of? F.H.—M. Mole and Son, Ltd., 51-56 Charlotte St., Birmingham 3. (21978)

"Savoy" refrigerators, makers of? J.W.—These were made by the Savoy Refrigerator and Mfg. Co., Ltd., a firm which went out of business in 1937. Refrigeration and Maintenance Co., 50a Fort Rd., S.E.1, should be able to undertake repairs. (21983)

"Humex" greenhouse heaters, makers of? M.A.—Roberts Electrical Co., Ltd., 98-100 Lavender Hill, Battersea, S.W.11. (21991)

"Rulag" batteries, makers of? H.S.—Falk Stadelmann and Co., Ltd., 91 Farringdon Rd., E.C.1. (21996)

"Hall" erasing machine, makers of? W.H.—Hall Harding Ltd., Stourton House, Dacre St., S.W.1. (22003)

"Rolyat" immersion heaters, makers of? B.C.—Try the Rolyat Tank Co. Ltd., Cromwell Rd., York, who produce the "Rolyat" domestic water heating system. (22014)

The above are selected from questions we have answered this week. If you have a query, send it to us.

ANSWER WANTED

13 amp flat pin, plug and socket with mercury switch, makers of? B.L. (22022)

CONTRACTS PLACED

Alnwick U.D.C. Conversion of street lighting from gas to electricity, B. L. Oliver, £3,560.

Arnold (Notts) U.D.C. Supply and erection of 89 140 W sodium discharge lamps on concrete columns along trunk road A.60, Revo Electric Co., Ltd.

Blackburn T.C. Lighting schemes in Salford, £1,225, and in Billinge Ave. and Buncer Lane, £758, N.W. Electricity Board.

Durham. Electrical work at Hartlepool West View school, Devereux Moodie and Co., Ltd., £1,664.

London C.C. Electrical work in Winton school, and Holmes Rd. school, Buchanan and Curwen Ltd., same at Mansford St. school, H. M. Horton Ltd.

Middlesex. Alterations to lighting installation at Enfield Technical College, Watson and May Ltd., £1,526.

Newcastle-on-Tyne. Lighting and power installations at Blakelaw secondary school, A. S. Lowery, £6,916; supply of 600V single-core cable for Slatyford Lane bus depot, and l.t. cable for same, Aberdare Cables Ltd., £4,340 and £2,221 resp.

Sutton and Cheam (Surrey) T.C. Street lighting improvements along A24 and A232, G.E.C. Ltd., £5,938; along A217, Harland and Wolff Ltd., £1,154; and along A217, Crompton Parkinson Ltd., £3,333.

PRICES OF CABLE METALS AND OTHER MATERIALS
(at Tuesday night)

	£ s. d.	New York price
COPPER, electrolytic	227 0 0	£220 0 0
LEAD, good soft pig (foreign)	175 0 0	152 0 0
,, ,, ,, "English" quality	176 10 0	
Tin (99·99·75%) ... ...(Cash)	987½-992½	—
,, (3 months)	555-560	—
ALUMINIUM, commercial purity (del.)	124 0 0	—
ZINC	190 0 0	156 0 0
ARMOURING:		
Galv. Steel Wire (0·104 in.)	55 5 0	—
Mild Steel Tape (0·04 in.)	32 5 0	—

GAZETTE ANNOUNCEMENTS

COMPANIES ACTS

A. C. Ashton and Sons (Cottingham) Ltd. Resolution for voluntary winding-up passed on Nov. 8. Stanley Dowsland Moore, 4 Silver St., Hull, was appointed liquidator.

A.F.A. Accumulators Ltd. Meetings of members and creditors to be held at Lacon House, Theobolds Rd., W.C.1, on Dec. 17 at 3.30 and 4 p.m. resp., to receive liquidator's report.

C.M.C. (Switchmatic) Ltd. Resolution for voluntary winding-up passed at meeting on Oct. 29. J. S. Bradley-Hole, of A. E. Orbell and Co., 7 Old Steine, Brighton, was appointed liquidator.

Compound Electro Metals Ltd. Meeting of members will take place at 50 Gresham St., E.C.2, on Dec. 17 at 10 a.m. to receive liquidator's report.

Gordon Refrigeration Co., Ltd. Meeting of creditors to be held at 24 Portland Pl., W.1, on Nov. 26 at 11 a.m. to fill vacancy on Committee of Inspection.

Hartog Electric Lighters Ltd. Meeting of creditors will take place at offices of Stoneham and Sons, 108A Cannon St., E.C.4, on Nov. 29 at 11.45 a.m.

E. J. Pike (Radio Acoustics) Ltd. Meeting of members will be held at 22 London Rd. North, Lowestoft, on Dec. 12 at 2.30 p.m. to receive liquidator's report.

W. D. Willson (Sussex) Ltd. Resolution for voluntary winding-up passed at meeting on Nov. 8, when J. T. Morgan, 100 Park St., Grosvenor Sq., W.1, was appointed liquidator.

Release of Liquidator

London. Charlton Electrical Co. Ltd., St. Martins-le-Grand, E.C. Liquidator was Leslie Clifford Ebb Webber, 14 Moorgate, London E.C.2.

BANKRUPTCY ACTS

First Meeting

London. Haine and Co., electricians, 77 Westbourne Grove, W.2. First meeting today (Thursday) at Bankruptcy Buildings, Carey St., W.C.2, at 12 noon, and public examination at same address on Dec. 19 at 11 a.m.

Great Yarmouth. Cyril Fox Burns, electrical and radio engineer, trading at High St., Stalham. Meeting took place yesterday (Wednesday) and public examination will be held at Town Hall, Gt. Yarmouth, on Dec. 13 at 10.30 a.m.

TRADE NOTES

B.E.A.M.A. Contract Price Adjustment Formulae. For purposes of calculating variations in (*a*) "Rates of Pay"—the rate of pay for adult male labour at November 10, 1951, shall be deemed to be 120s.; (*b*) "Costs of Material"—the index figure for intermediate products last published by the Board of Trade on November 10, 1951, is 374·3 and is the figure for the month of October, 1951.

Branch Office. Aluminium Wire and Cable Co. Ltd., have opened a Midlands branch office at Great Western Bldgs., 6 Livery St., Birmingham 3. Tel.: Central 5370.

Changes of Address. As from December 1, the head office address of the British Aluminium Co. Ltd., will be Norfolk House, St. James's Square, London, S.W.1. Tel.: Whitehall 7868.

From November 26 the Hull office of British Insulated Callender's Cables Ltd. will be at 199 Anlaby Road. Phone No. is unchanged.

Expansion. A new factory is to be built in South Inch Terrace, Perth, for James Scott and Co. (Electrical Engineers) Ltd. The factory is principally for prefabricating house and farm installations, and manufacture of switchboards and generating plants.

Indian Imports. The Government of India has placed electric generators of over 25 b.h.p., together with switchgear and instruments (but not transformers), on open general licence up to the end of June, 1952. In the case of steam turbines, the associated steam-raising equipment may also be imported.

New Telephone No. The new telephone no. of the British Distributing Co. is Mountview 0055.

New Showroom. Philips Electrical Ltd. last week opened a new showroom at the Newcastle-on-Tyne branch.

BUSINESS PROSPECTS

HOME

Angus. County Housing Committee is to spend £6,700 on modernising houses at Longhaugh, Muirhead and Hillside.

Belfast. It is proposed to build a £228,028 school at Dunkeld Gardens. Also a factory is to be built on Castlereagh estate (No. 6 site) for Ministry of Commerce, Chichester House, Chichester St.

Blyth R.D.C. Erection of 16 houses at Framlingham. H. W. Lovell, Council Offices, Rendham Rd., Saxmundham.

Bury St. Edmunds T.C. It is proposed to build 44 houses at Samson Close and Reeve Close.

Cheshunt U.D.C. Erection of 86 dwellings in Hillview Gardens. Architects are Clifford Culpin and Partners, 3 Southampton Place, W.C.1.

Cork (Eire). Erection of new monastery at Deer Park for Christian Brothers. Architect is J. R. Boyd Barrett, 5 Camden Place, Cork.

Crewe T.C. Erection of 14 shops with 12 flats on Middlewich St. estate. Leonard Reeves, Borough Engineer and Architect, Municipal Buildings.

Cumberland. Approval sought for erection of school at Cleator Moor at cost of £113,606.

Durham. Twenty houses to be built at Framwellgate Moor and 12 flats in Church St. Plans prepared for 36 flats in Churchill Av. area.

Easington R.D.C. Sanction received to borrow £61,108 for erection of 12 bungalows at Horden, 8 at Blackhall, 18 houses at Murton and 12 at S. Hetton. Approval granted for 8 shops & flats and 148 houses for Peterlee Development Corporation.

East Riding. County Hall to be erected on St. Mary's Manor estate, Beverley.

East Sussex. Construction of first instalment of Burgess Hill county secondary school. J. Catchpole, County Architect, County Hall, Lewes.

Farnborough (Hants). Tenders to be invited shortly by Container Reclamation Co. Ltd., 82-94 Seymour Place, W.1, for erection of factory in Hawley Lane. Architect is E. D. Mills, 16 Carlisle St., Soho Sq., W.1.

Finchley T.C. It is proposed to build 50 dwellings on Elmhurst estate, 12 each in Gordon Rd. and High Rd., and 6 at Downway.

Gloucestershire. Approval received for erection of Brockworth primary infants', Arle primary and Churchdown secondary modern schools.

Godalming T.C. Construction of 26 dwellings on Binscombe Farm estate. Borough Engineer and Surveyor, Branksome, Filmer Grove, Godalming.

Grangemouth. Dean of Guild Court has approved factory extensions in Earls Rd. for I.C.I. Ltd., estimated to cost £57,260.

Grantham T.C. Erection of 33 houses in Harrowby and Belton Lanes areas. Borough Surveyor, Guildhall.

Hampstead. Consideration is being given to a £400,500 scheme for erection of 100 flats in development of Finchley Rd. site.

Hamilton. Dean of Guild Court has approved erection of carpet and rug factory at Burnbank for Archibald Stevenson and Son Ltd.

Harrow U.D.C. Construction of 36 flats on Woodlands estate and 40 dwellings in Rayners Lane. Engineer and Surveyor, J. H. Melville Richards, Council Offices, "Cottesmore," Uxbridge Rd., Stanmore.

Hendon B.C. Erection of 7 houses, 46 flats and 8 maisonettes at Mill Hill. Borough Engineer and Surveyor, Town Hall.

Lambeth B.C. Preliminary plans approved for erection of secondary school in Upper Tulse Hill. Estimated cost, £589,800.

Launceston T.C. Construction of 20 houses on Roydon Rd. estate. Council's Architect. Arthur Wise, 2 Tamar Terrace.

Mansfield T.C. Plans approved for erection of 212 houses on Debdale estate.

Mansfield Woodhouse U.D.C. Construction of 72 houses at Forest Town. W. W. F. Shuker, Surveyor and Water Engineer, Council Offices, Manor House.

Newbury T.C. Thirty-two houses to be built on Shaw estate.

Newcastle-on-Tyne. Erection of 1,000 flats in multi-storeys on Longbenton estate. City Architect, 18 Cloth Market, Newcastle.

Plymouth. It is proposed to build 36 houses at Whitleigh.

Portsmouth. Plans approved for construction of primary schools at Highbury and Somers Rd.

Retford T.C. Tenders to be invited shortly for installation of electric lighting in Ordsall Rd. pumping station.

Romford T.C. Revised plans for 32 houses on Hillfoot Rd. site have been submitted for approval.

Rothwell. A new school is to be built at estimated cost of £133,000. Work expected to begin next March.

Salford. Application to be made for sanction to borrow £233,200 for erection of police H.Q., which will include lighting installations.

Smethwick. Erection of first instalment of major extensions to Chance Technical College. Chief Education Officer, 215 High St.

Sunderland. Bristol Aircraft Co. are to take over factory at Pallion and build extensions covering some 50,000 sq. ft.

OVERSEAS

Cuba. J. Barriero y Compania, Internacional Electrica, Obrapia 501-505, Apartado 1364, Havana, want to obtain agencies for U.K. manufacturers of electrical supplies, wiring devices, wires, cables, conduits and other accessories, lamps and bulbs, lighting fixtures, etc.

Nigeria. It is reported that a reasonable market could now be found for suitable air-conditioning equipment. Demand would be for small, simply operated, easily maintained and inexpensive unit designed to reduce both humidity and temperature. Manufacturers should contact Z. Borys, 150 Broad St., Lagos.

Singapore. Indo-Pacific Fisheries Council want to contact U.K. supplies of navigation aids and refrigeration plant. Interested firms should contact T. W. Burdon, Fisheries Dept., Singapore Govt., P.O. Box 749, Singapore.

U.S.A. Cra-Bell Vacuum Cleaner Co., 216 Hathaway, Houston, Texas, would like to receive quotations for vacuum cleaners.

MEETINGS TO NOTE

THURSDAY, NOV. 22

I.E.E. (London Utilization Section).—"Electrical Control of Dangerous Machinery and Processes—Part 3." W. Fordham Cooper. Savoy Place, 5.30 p.m.

I.E.S. (Bradford Group).—"Lighting of Departmental Stores." A. W. Jervis. Y.E.B., 45-53 Sunbridge Rd., 7.30 p.m.

FRIDAY, NOV. 23

I.E.E. (N. Staffs sub-centre).—Annual dance at Crown Hotel, Stone, 8 p.m.

ELECT. POWER ENGRS. ASSOC. (S.E. Div.).—Twenty-fourth annual dinner at Connaught Rooms, London, 5.30 p.m.

I.E.E. (N.E. Students Section).—"Experiences on an Australian Distribution System." E. G. Williams. King's College, Newcastle, 6.30 p.m.

MONDAY, NOV. 26

I.E.E. (London Radio Section).—Discussion on "Should Broadcasting be superseded by Wire Distribution?" opened by P. P. Eckersley. Savoy Place, 5.30 p.m.

I.E.E. (N.E. Centre).—"Dimming of Low-Pressure Discharge Lamps." C. E. Williams. Neville Hall, Westgate Rd., Newcastle, 6.15 p.m.

I.E.E. (S. Midland Radio Group).—"Life and Reliability of a Radio Valve." H. G. Metson. James Watt Memorial Inst., Gt. Charles St., Birmingham, 6 p.m.

I.E.E. (Western Utilization Group)—"Development of Electrical System in Bristol Brabazon Aircraft." M. J. J. Cronin. S. Wales Inst. of Engrs., Park Place, Cardiff, 6 p.m.

I.E.S. (Leeds Centre).—"Hospital Lighting." J. K. Frisby. L.S.B., Aire St., 7 p.m.

A.S.E.E. (Bournemouth Branch).—"Applications of Electricity in Gas Production." O. H. Baker. Grand Hotel, Firvale Rd., 8.15 p.m.

TUESDAY, NOV. 27

I.E.E. (London Students Section).—"Use of Working Scale Models in Development of Broadcasting Aerials." T. R. Boys. Savoy Place, 7 p.m.

I.E.E. (N. Midland Utilization Group).—"New Power Stroboscope for High-Speed Flash Photography." W. D. Chesterman, D. R. Clegg, G. T. Peck and A. J. Meadowcroft. L.S.B., Aire St., Leeds, 6.30 p.m.

I.E.E. (N.W. Utilization Group).—Conference on I.E.E. report, "Electricity as Aid to Productivity." Engrs. Club, Albert Sq., Manchester, 10 a.m.

I.E.E. (S. Midland Centre).—"Design and Performance of Surge Diverters for Protection of A.C. Systems." T. F. Monahan. Hylton Rd. Power Station, Worcester, 7.15 p.m.

SOC. OF INSTRUMENT TECHNOLOGY. "Visual Presentation of Instrument Data." K. F. H. Murrell. Manson House, Portland Place, W.1, 6.30 p.m.

MIN. OF WORKS.—Lecture at Burton-on-Trent. "Heating and Heat Insulation." G. D. Nash. Little Theatre, Union St., 7.15 p.m.

WEDNESDAY, NOV. 28

I.E.E. (London Supply Section).—"A Statistical Approach to some Problems in Electricity Supply." R. B. Rowson, Savoy Place, 5.30 p.m.

I.E.E. (N.W. Radio Group).—"Investigation into Mechanism of Magnetic Recording." P. E. Axon. Engrs. Club, Albert Sq., Manchester. 6.30 p.m.

I.E.E. (S.W. sub-centre).—"Operation and Maintenance of TV Outside-Broadcast Equipment." T. H. Bridgewater. Rougemont Hotel, Exeter, 3 p.m.

I.E.S. (London).—Report and discussion on 1951 Meeting of C.I.E. L.S.B., Savoy Hill, 6 p.m.

THURSDAY, NOV. 29

I.E.E. (Scottish Centre).—"Use of Saturable Reactors as Discharge Devices for Pulse Generators." 39 Elmbank Crescent, Glasgow, 7 p.m.

INCORP. PLANT ENGRS. (S. Yorks Branch).—"Mechanical Handling." D. Roebuck. Grand Hotel, Sheffield. 7.30 p.m.

A.S.E.E. (Luton Branch).—"Oil Switchgear Failures and Their Causes." N. Elliott. George Hotel, 8 p.m.

FRIDAY, NOV. 30

I.E.E. (London Students Section). Joint dance with Instn. of Civil Engrs. aqd Instn. of Mechanical Engrs. St. Pancras Town Hall, N.W.1, 7 p.m.

MANCHESTER ASSOC. OF ENGRS.—Open Meeting and general discussion Engineers Club, Albert Sq., 6.45 p.m.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Aeg. 693, 119. Class 7. Generators, motors, steam and gas turbines, etc. Allgemeine Elektricitats-Gesellschaft, 150 Hohenzollerndamn, Berlin - Grunewald, Germany.

Crystal. 700,562. Class 7. Machines for spraying paint and similar materials. Crystal Spray Co. Ltd., Temple Chambers, Temple Ave., E.C.4.

Dolphin. B700,089. Class 9. Marine radio apparatus. Pye Ltd., Radio Works, St. Andrews Rd., Cambridge.

Nevitron. 700,550. Class 9. Electric current rectifiers, and discharge apparatus. Nevelin Electric Co. Ltd., Purley Way, Croydon, Surrey.

Philips. With design B669,318. Class 7. Electric welding machines, magnetic clarifiers and filters, heat engines, generators, pumps, drilling machines, etc. Philips Electrical Ltd., Century House, Shaftesbury Ave., W.C.2.

Ram. 700,986. Class 9. Electric batteries and electric accumulators all sold complete. Christie and Sadler Ltd., 68 Finsbury Pavement, E.C.2.

Voicecast. B700,548. Class 9. Microphones. Reslosound Ltd., 359 City Rd., E.C.1.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, London W.C.2.

Aerotronics Ltd., Stable Works, 199a Uxbridge Rd., W.7. Designers and manufacturers of and dealers in electronic equipment, aircraft, radio and radar communications equipment, etc. Cap.: £1,000. Dirs.: C. E. J. Rockall, Clare L. Kaylor and J. R. Mackay.

Auto Engineering, Electrical and Coachbuilding Co. Ltd., Albion Garage, Albion St., Newport, Mon. Cap.: £500. C. E. Oldfield signs as director.

G. N. Burgess and Co. Ltd., Hanworth Trading Estate, Hampton Rd., Feltham, Mddx. Motor, electrical, mechanical and general engineers and engineering contractors, etc. Cap.: £1,000. Dirs.: G. N. Burgess and Joan M. Burgess.

Disc Motor and Pump Co. Ltd., Bristol Rd., Bridgwater, Som. Manufacturers of and dealers in electric motors for the operation of bore-hole pumps and all machinery, appliances and apparatus connected with pumps, etc. Cap.: £100. Dirs.: N. Pensabene-Perez and E. J. Timberlake and K. W. Hogan.

C. T. Henderson Ltd., Beechfield, Towers Rd., Poynton, Cheshire. Dealers in radio, television, electrical and mechanical apparatus, etc. Cap.: £1,000. Dirs.: C. T. Henderson and Mrs. F. Henderson.

Martallen Engineers Ltd., 11, Muswell Hill Rd., N.10. Motor, civil, electrical and general engineers, etc. Nom. cap.: £1,000. Dir.: J. Mansell and Mrs. R. Mansell.

Mea-Dion Products Ltd., Fulwood House, Fulwood Place, W.C.1. Manufacturers of and dealers in electrical and radio goods, etc. Cap.: £1,000. Dirs.: E. Meadows, G. Dion and Doris M. Buckeridge.

NEW COMPANIES continued

Midelect Co. Ltd., 35 Woolpack Lane, Nottingham. Wholesale dealers in and manufacturers and repairers of artificial lighting apparatus, electrical plant, machinery, etc. Cap.: £1,000. Dir.: O. W. Mayolfi.

Moor End Engineering Co. Ltd. Cap.: £2,000. Manufacturers of and dealers in electric power and transmission plant and equipment, etc. Dirs.: B. S. Cook, 61 New Laithes Hill, Huddersfield, and F. Morton.

Prince Brothers Ltd., Central Chambers, Green St., Manchester. Electrical engineers and contractors, etc. Cap.: £2,000. Dirs.: W. Norbury, Mrs. H. Prince and W. Pickup.

Proctor, Boreham and Co. Ltd., 10 The Croft, Heston, Mddx. Motor, electrical, civil, consulting, constructional, general and mechanical engineers, etc. Cap.: £100. Dirs.: E. E. Proctor and N. G. A. Boreham.

Refrigeration (Hove) Ltd., 1 Victoria Terrace, Kingsway, Hove, Sussex. Cap.: £1,000. Dirs.: H. Allen and Madelina Allen and D. Revell.

Ridgeway Hinds and Co. Ltd., 223 Upper Thames St., E.C.4. To take over business of an elec. and mech. engr. carried on at 29 Upper Thames St., E.C.4, by Geo. A. Ridgeway Hinds Cap.: £1,000. Permt. dirs., G. A. Ridgeway Hinds and Mrs. E. E. Hinds.

Smith and Butterill Ltd., 10 Upper Mulgrave Rd., Cheam, Surrey. Precision engineers, plant and machinery repairers, etc. Cap.: £1,000. Dirs.: W. Smith, and H. Butterill.

CALCUTTA TRAMWAYS

Further Traffic Expansion

THE annual general meeting of The Calcutta Tramways Company, Ltd., was held on November 19 in London.

Mr. D. E. Webb, F.C.A., the chairman, in the course of his speech, said: During the year under review our balance on General Revenue Account increased by some £20,000. This was mainly due to an increase in traffic receipts of £66,000, partially offset by an increase in Working Expenses of £44,500. It is proposed to pay a final Ordinary dividend of 3½% free of tax, making 6% for the year.

Year's Operations

On the Assets side of the balance-sheet, stocks and stores have increased by £120,000. This is largely accounted for by the purchase of components for the new tram cars, and the collection of stores in connection with the re-alignment of the junction at Esplanade. The 30 new trams are now in service, and their cost will be transferred to Rolling Stock Account during the current year.

During 1950 we carried 324 million passengers. This is a very large figure, but, during the first six months of 1951 we have carried 23 million passengers more than in the corresponding period of 1950. Figures of this size are hard to visualise, but of one thing there can be no doubt. Such figures are only attainable by a highly skilled organisation and by a loyal and willing staff. I should like to pay tribute to all the men who maintain and operate our system. To them it is due that receipts continue to increase, enabling us to pay higher wages and cost of materials and at the same time provide an efficient service at pre-war cost.

1950 marks the seventieth year of your company's existence. This year we reached a milestone in the history of the company. On August 30th a new agreement was signed with the Government of West Bengal. As you may remember, it has been felt for some time by your Board that the old agreements had become burdensome and unjust to all parties. By their terms, both Government and the Corporation were forced into opposition of the company and it was clear that, in the long run, the continuance of those agreements could only militate against the efficiency of the service given to the Public of Culcutta.

A new agreement has been drawn up, therefore, under which the Government and the Company will work in harmony for the next 20 years and, if, at the end of that time, the Government wish to take over your undertaking, they can do so on terms already agreed. We consider that those terms are just and equitable.

A confirmatory Bill was passed in the West Bengal Legislature on September 21 with little opposition and the Governor's assent was given on October 11. During the passage of the Bill it was apparent that the majority considered the present time inappropriate for the nationalisation of your undertaking and were not convinced by the arguments of the opposition that nationalisation was required for the sake of efficiency and as a protection against the exploitation of the employees. Indeed, it is difficult to appreciate, in this case, any reasons why the State should inject a new fervour for efficiency into the minds of the men who run your undertaking and who have spent their lives in the tramway world. As for the employees, their wages and conditions of employment are controlled by Arbitration Tribunals who very properly guard them against any threat of exploitation.

Modernisation

Last year I mentioned the progress made in modernising our rolling stock. Since then 30 new English Electric articulated cars have gone into service and we are now working on a programme for replacing the last 23 cars built before 1926. This should be completed by April next year. Our staff are continually experimenting with new and improved designs, and we hope, in the course of the next year, to test prototypes of some of these.

I regret that little, if any, progress has been made towards the realignment of the important junction at Esplanade. Whilst we have now obtained the official sanction of the Government to the project, we are still waiting for agreement on the precise area of Government land to be taken over.

In August 1951, the new substation on Chowringhee was brought into commission. It has already shown its value in spreading our increased power load due to the extra cars.

Once more I would like to express appreciation of us all for the efforts of our executive staff. They shoulder great responsibilities and the good results of the year are, in very large measure, due to their untiring efforts.

The report was adopted.

In their fine new factory at Dunmow, Essex, Messrs. Butcher & Son Ltd. used HENLEY CABLES exclusively for the electrical installation. Messrs. Butcher, in addition to their business of agricultural and general engineers and manufacturers, make extensive use of HENLEY CABLES in their electrical contracting service. Whether the current is carried by day or night, it pays to specify HENLEY.

Architect: Basil I. Briggs, A.R.I.B.A.

Day and Night

HENLEY CABLES

carry the current

BY APPOINTMENT ELECTRIC CABLE MANUFACTURERS

W. T. HENLEY'S TELEGRAPH WORKS CO. LTD., 51-53, HATTON GARDEN, LONDON, E.C.1.

WESTON

Electrical Measuring Instruments

No. 4 . . . 6" Scale Switchboard Instruments

Weston 6" scale switchboard instruments combine the sensitivity of a laboratory instrument with the robust qualities necessary in a switchboard pattern. The range includes the Model S.57, which is supplied as a D.C. Microammeter, Milliammeter, Ammeter or Voltmeter: The S.58 which incorporates a thermocouple for the measurement of H.F. currents and is available as a Milliammeter or Ammeter: The Model S.59, incorporating a metal rectifier for the measurement of A.C., is supplied as a Milliammeter or Voltmeter and the Model S.60 is a Moving Iron Instrument for A.C. or D.C. measurement and is available as a Milliammeter, Ammeter or Voltmeter. The illustration shows the Model S.60 in the projecting type case. All models are available in either projecting or flush type moulded Bakelite cases. Further information and full details of the ranges supplied available on request.

SANGAMO WESTON LIMITED

Enfield, Middlesex. *Tel: Enfield 3434 (6 lines) & 1242 (4 lines).* *Grams: Sanwest, Enfield*

Branches: Glasgow, Manchester, Newcastle-on-Tyne, Leeds, Liverpool, Wolverhampton, Nottingham, Bristol, Southampton & Brighton

CLASSIFIED ADVERTISEMENTS

OFFICIAL TENDERS AND APPOINTMENTS

WANTED · FOR SALE WORK WANTED

Those wishing to advertise in these pages should send the text to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia St., London W.C.2, before 10 a.m. on TUESDAY of week of issue. Official Displayed Advertisements are charged at 42s. per inch, and all other classified advertisements at 3s. 0d. per line. Situations Wanted will be published four times for twice the single insertion rate. Fee for Box No. and postage on replies is 2s.

TENDERS INVITED

CITY OF BELFAST

Electricity Department

HARBOUR POWER STATION

TENDERS are invited as under:—

(a) The supply, delivery and erection of—

(1) One 7½ ton and one 5 ton OVERHEAD TRAVELLING CRANE, designed for electric hoisting and hand travelling and traversing motions (Form of Tender No. N.1179).

(2) One passenger/goods ELECTRIC LIFT of 2,000 lb. carrying capacity (Form of Tender No. N.1180).

(3) WORKSHOP MACHINERY AND EQUIPMENT, including 12¾ in. and 6¼ in. centres, surfacing and screwcutting gap bed lathes, radial drilling machine, sensitive drilling machine, 24 in. shaping machine, and other equipment (Form of Tender No. N.1181).

(4) One self contained ROAD TRANSPORT WEIGHBRIDGE capable of weighing gross loads up to 30 tons, complete with indicating equipment and recording equipment of the ticket printing type (Form of Tender No. N.1054).

(b) Lighting, heating and auxiliary power installation (Form of Tender No. N.1163).

Forms of tender, conditions and specifications, in quadruplicate, may be obtained from Messrs. Merz and McLellan, Consulting Engineers, Carliol House, Newcastle-upon-Tyne 1, on payment of a deposit of £5 5s. for each item. Deposits will be refunded provided bona fide tenders be lodged and not withdrawn. Extra copies of the contract documents may be obtained at £3 3s. per set; this sum will not be returnable. Cheques should be made payable to the Belfast Corporation Electricity Department.

Each tender, in quadruplicate, in sealed envelope, marked "Tender for ....., Electricity Committee," and endorsed with the name and address of the tenderer, must reach the undersigned not later than 4 p.m. on Friday, January 4, 1952.

An official receipt must be obtained for each tender delivered by hand. Tenders sent by post should be registered.

The lowest or any tender will not necessarily be accepted.

JOHN DUNLOP,
Town Clerk.

City Hall, Belfast.
November 16, 1951. (P 226)

NORTH OF SCOTLAND HYDRO-ELECTRIC BOARD

Lorne and The Isles Area

22 kV, 11 kV AND LOWER VOLTAGE DISTRIBUTION LINES

TENDERS are invited for the supply, delivery and erection of approximately 47 miles of 22 kV, 10 miles of 11 kV and 30 miles of lower voltage single circuit wood pole overhead transmission and distribution lines in the Islands of Benbecula, South Uist and Eriskay in the County of Inverness.

Copies of the tender document may be obtained on application to the Engineers, Messrs. Merz and McLellan, 39 Northumberland Street, Edinburgh 3. Applications should be accompanied by a cheque for £1 1s. (returnable).

The Board do not bind themselves to accept the lowest or any tender.

W. D. D. FENTON,
Secretary.

16 Rothesay Terrace,
Edinburgh 3.
November 14, 1951. (P 205)

AIREBOROUGH URBAN DISTRICT COUNCIL

INSTALLATION OF 250 WATT MERCURY DISCHARGE STREET LIGHTING ON LEEDS ROAD BETWEEN NUNROYD, GUISELEY, AND RED BECK, RAWDON DISTANCE 2½ MILES (APPROX.)

TENDERS are invited for the supply and installation of 250 W Mercury Discharge Street Lighting on Leeds Road, between Nunroyd, Guiseley, and Red Beck, Rawdon, an approximate distance of two and a half miles. Separate tenders are invited as follows:—

1. Supply and erection of columns and brackets and the fitting and wiring of lanterns to column bases, etc.
2. Supply of lanterns and all auxiliary gear.

A firm may tender for both, but the Council reserve the right to accept separate tenders from different firms.

Copies of the plan, instructions to persons tendering, specification, bills of quantities, forms of tender and schedule of rates and prices may be obtained from, and general conditions of contract seen at, the office of the engineer and surveyor to the council at the address below on payment of a deposit of two guineas, which will be returned on receipt of a bona fide tender or the return of the documents.

Tenders, enclosed in a plain sealed envelope endorsed "Tender for street lighting," must be delivered to the undersigned not later than Monday, January 14, 1952.

The Council does not bind itself to accept the lowest or any tender, and the acceptance of a tender or tenders will be subject to the obtaining by the Council of any requisite consents.

RALPH H. HULME,
Clerk of the Council.

Council Offices,
Micklefield House,
Rawdon, near Leeds.
November 6, 1951. (P 147)

COUNTY BOROUGH OF GATESHEAD

NEW TECHNICAL COLLEGE—STAGE II

APPLICATIONS are invited from contractors desirous of tendering for the ELECTRICAL INSTALLATION to the above, in accordance with the scheme and specification prepared by the Consultants, Messrs. R. W. Gregory and Partners, Newcastle.

Copies of drawings and specification, and form of tender may be obtained, the general conditions of contract inspected, at the Chief Architect's Department, on deposit of £2 2s., which will be refunded on receipt of a bona fide tender, and the return of the drawings and specification.

The contract for the above work will form a sub-contract to the main building contract, and the sub-contractor will be required to enter into a bond with the general contractor and the Corporation.

Applications to tender should be made to H. J. Cook, A.R.I.B.A., M.I.Struct.E., Chief Architect, Municipal Buildings, Swinburne Street, Gateshead, within seven days of this advertisement, and tenders returned on the official form in the endorsed envelope supplied by noon on Monday, January 7, 1952.

The lowest or any tender will not necessarily be accepted.

J. W. PORTER,
Town Clerk.

Town Hall,
Gateshead 8.
November 12, 1951. (P 209)

BOROUGH OF SWINDON

RODBOURNE SEWAGE WORKS EXTENSIONS ELECTRICAL INSTALLATION

TENDERS are invited for the supply and installation of electric CABLING, WIRING, FITTINGS and EQUIPMENT required in connection with the extensions to the Rodbourne Sewage Works. The successful tenderer will be nominated by the Corporation and required to enter into a contract with the Corporation's main contractor.

The form of tender, specification and drawings may be

(Continued on next page)

(Continued from previous page)

obtained from the office of the Borough Surveyor, Swindon, on and after Monday, November 26, 1951, on payment of a deposit of £2 which is returnable on receipt of a bona fide tender.

Tenders, in sealed envelopes endorsed "Tender for Electrical Installation—Rodbourne Sewage Works", should reach the undersigned not later than Wednesday, December 19, 1951.

The Corporation do not bind themselves to nominate the lowest or any tenderer.

MURRAY JOHN,
Town Clerk.

Civic Offices, Swindon.
November, 1951. (P 237)

APPOINTMENTS VACANT

BRITISH ELECTRICITY AUTHORITY

North Western Division

APPLICATIONS are invited for the following superannuable positions. The salaries and conditions of service will be in accordance with the National Joint Board Agreement.

No. 608. STATION SHIFT CONTROL ENGINEER
Nelson Generating Station, Charles Street, Nelson, Lancs.

The salary will be £511 to £519 to £527 per annum, in accordance with Grade 10, Class "D." Technical qualification, and experience in a generating station is desirable.

No. 609. INSTRUMENT ENGINEER
No. 2 Sub Division Headquarters, Kearsley, Lancs.

The salary will be within the range £629 to £834 per annum, in accordance with Grade 5, Class "AX/DX" of Schedule C.

The successful applicant will be responsible for the organisation, within the group of stations comprising No. 2 Sub Division, for the efficient maintenance of all types of instruments associated with boilers and turbines other than purely electrical instruments. In particular, candidates must have had considerable experience in the operation and maintenance of automatic boiler control systems, and possession of a Higher National Certificate in Electrical or Mechanical Engineering, or an equivalent qualification, will be considered an advantage.

No. 610. SECOND ASSISTANT ENGINEER
System Operation Department, Divisional Headquarters, Manchester.

The salary will be within the range £809 to £1,058 per annum, in accordance with Grade 2, Class "AX/EX" of Schedule C.

The duties will include supervision of the collation and interpretation of statistical data relating to the generation and transmission of electricity. Corporate membership of the I.E.E. is desirable, and experience in a steam power station will be an advantage.

No. 611. GENERAL ASSISTANT ENGINEERS
System Operation Department, Divisional Headquarters, Manchester.

The salaries will be within the range £481 to £695 per annum, in accordance with Grade 8, Class "AX/EX" of Schedule C.

The duties will be of a general technical and statistical nature in connection with power station operation, and will include some shift duties in the grid control room. Applicants should have had a good general and technical education. Preference will be given to candidates who are graduates of the I.E.E. or who hold equivalent qualifications. Experience in a steam power station will be an advantage.

No. 612. STATION SHIFT CONTROL ENGINEERS (5)
Huncoat Generating Station, Accrington.

The salaries will be £557 to £568 to £578 per annum, in accordance with Grade 10, Class "F." Applicants should possess technical qualifications, and have had experience in a modern generating station.

Applications, quoting vacancy number, stating age, qualifications, present position, and giving full details of education and experience, should be addressed to the Establishment Officer, British Electricity House, 825 Wilmslow Road, Manchester 20, not later than November 30, 1951. (P 228)

BRITISH ELECTRICITY AUTHORITY

South Eastern Division

JUNIOR ENGINEER (CONTROL) at Croydon 'B' Generating Station. Applicants should have had suitable training and experience in the operation of E.H.T. switchgear and the parallel running of alternators. Class "J," Grades 18/14, commencing at £400 per annum, including London Allowance. Applications, on forms obtainable from Divisional Secretary, British Electricity Authority, South Eastern Division, Lower Ham Road, Kingston-on-Thames, Surrey, to be received by December 1, 1951. (P 234)

ASSOCIATION OF MANAGERIAL ELECTRICAL EXECUTIVE

APPOINTMENT OF SECRETARY

AN interesting appointment is open to a gentleman willing to devote part of his time to the services of the above Association.

A background of negotiating experience is desirable and knowledge of the electricity supply industry would be an advantage though not essential.

Further particulars can be obtained from the undersigned who will be pleased to receive applications in confidence on behalf of the Association.

A. E. MORGAN,
Hon. Secretary.

13 Victoria Street,
London S.W.1. (P 208)

BRITISH ELECTRICITY AUTHORITY

London Division

APPLICATIONS are invited for the following superannuable posts:—

STATION SUPERINTENDENT
St. Pancras Generating Station.

Candidates must possess good administrative, organising and managerial abilities and have experience of labour relations. A thorough practical and technical training with power station operation and maintenance experience is essential.

Salary and conditions of service in accordance with N.J.B. Schedule, Class "E," Grade 1, i.e. £1,046 17s. per annum inclusive of London Allowance.

TURBINE HOUSE SUPERINTENDENT
Battersea Generating Station

Candidates should have received a sound mechanical and electrical engineering training and technical education, preferably up to Higher National Certificate standard.

Candidates should have had wide experience in the operation and maintenance of large modern generating plant and auxiliary equipment, and should also have had a successful record in the direction and control of manpower.

Salary and conditions of service in accordance with N.J.B. Schedule, Class "L," Grade 6, i.e. £1,020 12s. per annum inclusive of London Allowance.

SHIFT CHARGE ENGINEER
Hammersmith Generating Station

Candidates should have received a sound electrical and mechanical training and have experience in the efficient operation of a generating station.

Character and ability to deal with staff problems is important.

Salary and conditions of service in accordance with N.J.B. Schedule, Class "D," Grade 7, i.e. £643 13s. per annum inclusive of London Allowance.

BOILER HOUSE CHARGE ENGINEER
Bow Generating Station

Candidates should possess good technical qualifications, preferably to Higher National Certificate standard, and previous operating experience of steam power stations; also practical experience in the operation of B. & W. boilers fitted with chain grates, and the usual ancillary plant.

Salary and conditions of service in accordance with N.J.B. Schedule, Class "F," Grade 9, i.e. £616 7s. per annum inclusive of London Allowance.

Applications for all the foregoing vacancies should be addressed to the Divisional Secretary, British Electricity Authority, London Division, Ergon House, Horseferry Road, S.W.1, and be received within 14 days of the appearance of this advertisement.

J. N. WAITE,
Divisional Controller.
(P 231)

SOUTHERN ELECTRICITY BOARD

FIELD ENGINEERS
(Amended Notice)

CONSTRUCTION Department of No. 2 (Newbury) Sub-Area, East Region and North Region (two vacancies).

Salary N.J.B. Class "K," Grade 13, Column 1, £563 per annum. N.J.B. conditions of service.

Candidates should have had experience in preparing for, and supervising the erection of, overhead lines and sub-station equipment and the laying and jointing of underground cables operating at voltages of 33 kV and below.

The successful candidates will be required to contribute to the B.E.A. and Area Boards' Superannuation Scheme, if eligible.

Applications on forms obtainable from the Sub-Area Secretary, 7 Oxford Road, Newbury, Berks, and returned to him not later than December 3, 1951.

F. W. KEMPTON,
Secretary.

November 22, 1951. (P 232)

YORKSHIRE ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments:—

No. 1 (Bradford) Sub-Area

ASSISTANT INSTALLATION ENGINEER
(Bradford District) (Vacancy No. 128/51)

Applicants will be required to assist the Installation Engineer in the organisation and administration of the Contracting Section, including supervision of manual workers. Must be capable of preparing specifications, estimates and tenders for all classes of domestic, commercial and industrial installations, dealing with correspondence and supervising complete installations of all types. A thorough knowledge of the Electricity Supply Regulations and the I.E.E. Regulations for the electrical equipment of buildings is essential.

Salary: N.J.B. Agreement, Class "H," Grade 12, £545/£566 per annum.

ASSISTANT CONSUMERS' ENGINEER
(Bradford District) (Vacancy No. 128/51)

To generally assist the Consumers' Engineer with regard to the organisation of the Installation Inspection Section and the Repairs Workshop.

Salary: N.J.B. Agreement, Class "H," Grade 13, £503/£522 per annum.

Applications, stating the above vacancy numbers, and giving full details of age, qualifications, and experience, should be forwarded to the Manager, No. 1 (Bradford) Sub-Area, Yorkshire Electricity Board, 45-53 Sunbridge Road, Bradford, within 14 days of the appearance of this advertisement.

No. 6 (Hull) Sub-Area

GENERAL ASSISTANT ENGINEER
(Meters, Testing and Protection) (Vacancy No. 152/51)

Applicants should hold the Higher National Certificate or equivalent qualification and have experience in the repairing and testing of all classes of meters and instruments together with their installation and maintenance. Some knowledge of protection gear will be an advantage.

Salary: N.J.B. Agreement, Class "J," Grade 13, £532/£553 per annum.

Applications, stating the above vacancy number, and giving full details of age, qualifications, and experience, should be forwarded to the Manager, No. 6 (Hull) Sub-Area, Yorkshire Electricity Board, Ferensway, Hull, within 14 days of the appearance of this advertisement.

(P 220)

PORTSMOUTH MUNICIPAL COLLEGE

Principal: LEONARD B. BENNY, M.A. (Cantab.)

ELECTRICAL ENGINEERING DEPARTMENT

APPLICATIONS are invited for a full-time post of ASSISTANT, Grade B in the above department. Candidates should have some previous teaching experience, and must be able to teach electrical installation work for the City and Guilds Courses B and C, and electrical engineering up to at least Ordinary National Certificate level. Industrial experience is an essential qualification, and corporate membership of the Institution of Electrical Engineers is desirable.

Applications should be made on forms to be obtained from the Registrar, at the College, to whom they should be returned as soon as possible.

E. G. BARNARD, M.A.,
Chief Education Officer.

November 13, 1951. (P 238)

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments in the Board's No. 2 Sub-Area.

(1) SECTION ENGINEER (St. Helens District). Salary N.J.B. Class "F," Grade 7 (£677 to £696). Applicants should preferably have the technical qualifications to enable them to become Chartered Electrical Engineers, and have had experience in h.v. and m.v. overhead and underground distribution work.

(2) ENGINEERING DRAUGHTSMAN (Headquarters, Electricity House, Sandiway, Nr. Northwich). Salary N.J.B. Grade 6, (£413 to £547). Applicants should have had experience of substation construction, h.v. and l.v. plan layout and the preparation of switchgear wiring diagrams. Possession of Higher National Certificate in Electrical Engineering will be an advantage.

The appointments are superannuable and subject to medical examination.

Application forms, obtainable from the Manager, No. 2 Sub-Area, M.A.N.W.E.B., Electricity House, Sandiway, Nr. Northwich, Cheshire, should be completed and returned not later than December 10, 1951.

JAMES RANKIN,
Secretary.
(P 223)

SINGAPORE MUNICIPAL ELECTRICITY DEPARTMENT

RESIDENT ENGINEER STAFF
PASIR PANJANG POWER STATION

APPLICATIONS are invited for the undermentioned temporary posts on the Resident Engineer Staff for the Pasir Panjang Power Station, which is at present under construction, and will consist of four 25 MW turbo alternators and six 187,500 lb oil fired boilers, 625 lb/sq in. pressure, 825° F. superheat, with provision for further extensions.

The vacancies are :—

(a) DEPUTY RESIDENT ENGINEER, to be appointed immediately.

(b) 2 JUNIOR ASSISTANT ENGINEERS, one for appointment in March, 1952; one for appointment in June, 1952.

Candidates should be corporate or graduate members of one of the senior engineering institutions or posssess equivalent qualifications, and have had a sound training in electrical and mechanical engineering with subsequent practical experience in the construction, installation, and operation of steam turbine generating plant water tube boilers, e.h.t. switchgear and ancillary equipment.

Salaries of the posts are:—(a) $2,400 per month; (b) $1,450 per month (inclusive of transport allowance and cost of living allowance). ($1·00 =2s. 4d.)

Free first-class return passages for officer, his wife and children up to three full passages in all.

Rent of municipal quarters if available, $80 per month in respect of (a), and $50 per month in respect of (b).

Period of service, two years for the completion of the first section of the works, with the possibility of extension by mutual consent as the work may require.

Applications, endorsed " Resident Staff, Singapore," stating age, qualifications and experience, should be forwarded to the undersigned within 14 days of the date of this advertisement.

PREECE, CARDEW AND RIDER.
8 and 10 Queen Anne's Gate,
Westminster, London S.W.1. (P 206)

CROWN AGENTS FOR THE COLONIES

AREA SUPERINTENDENT required by the Government of Sierra Leone for the electricity branch of the Public Works Department for two tours of 18-24 months in the first instance. Commencing salary according to qualification and experience in scale £774, rising to £1,060 a year including expatriation pay and temporary allowance. Gratuity of £25 for each completed period of three months payable on satisfactory completion of service. Outfit allowance £80. Free passages. Liberal leave on full salary. Candidates must have served an appropriate apprenticeship and have had some years practical experience in a responsible position on the erection, operation and maintenance of Diesel engines, in sizes ranging from 50 h.p. to 500 h.p. They must also have a good knowledge of the erection, operation and maintenance of 3 phases 4 wire 400/230 V overhead distribution systems, the running of alternators in parallel and similar matters connected with the operation of a public supply system.

Apply at once by letter, stating age, full names in block letters, and full particulars of qualifications and experience, and mentioning this paper to the Crown Agents for the Colonies, 4 Millbank, London S.W.1, quoting on letter M.29559B. The Crown Agents cannot undertake to acknowledge all applications, and will communicate only with applicants selected for further consideration.

(P 207)

MIDLANDS ELECTRICITY BOARD

APPLICATIONS are invited for the position of DEMONSTRATOR in the Wednesbury District. Applicants must have had a good general education, and the possession of a recognised diploma in Domestic Science and Electrical Housecraft will be considered an advantage. Candidates must be able to conduct lecture demonstrations both in the service centres and on consumers' premises, and to advise consumers on the selection and use of electrical apparatus. Salary and conditions of service will be in accordance with the National Joint Council, Grade 1, within the range £360 to £400 per annum with further progress to £440 per annum, dependent upon a certificate of capability. The successful applicant will be required to contribute to the B.E.A. and Area Boards' Superannuation Scheme, if eligible. Applications, in writing, stating age, education qualifications, details of training and subsequent experience, should be forwarded within seven days to Sub-Area Manager, (Ref. C.W.), Midlands Electricity Board, Toll End Road, Tipton. (P 235)

SOUTH WESTERN ELECTRICITY BOARD

VACANCY for DEMONSTRATOR in the Exeter District of the Devon Sub-Area. Salary within Grade 1 (£360 by £20 to £440) of the N.J.C. salary agreement. Preference will be given to candidates possessing a recognised domestic science qualification. Applications, stating age, present position and salary, qualifications and experience should reach the District Manager, 46 North Street, Exeter, within 14 days. (P 233)

BRITISH ELECTRICITY AUTHORITY

South Western Division

SHIFT CHARGE ENGINEER
Feeder Road Generating Station

APPLICATIONS are invited for the position of Shift Charge Engineer at Feeder Road Generating Station, Class "E," Grade 7, £629 to £660 per annum.

Applicants should have good technical experience, a sound knowledge of the operation and maintenance of generating plant, and preference will be given to applicants possessing the Higher National Certificate or equivalent qualification.

The appointment will be superannuable under the British Electricity Authority and Area Boards Superannuation Scheme.

Applications, stating age, qualifications, experience, present appointment and salary, should be addressed to the Divisional Secretary, British Electricity Authority, South Western Division, British Electricity House, 26 Oakfield Road, Bristol 8, so as to be received not later than December 3, 1951.

R. C. BARRETT,
Divisional Secretary.

November 13, 1951. (P 198)

BRITISH ELECTRICITY AUTHORITY

South Western Division

BOILER HOUSE SHIFT CHARGE ENGINEER
Portishead "A" Generating Station

APPLICATIONS are invited for the position of Boiler House Shift Charge Engineer at Portishead "A" Generating Station. Salary and conditions will be in accordance with the N.J.B. Schedule, Class "J," Grade 9, £699 to £728 per annum.

Candidates should have good technical experience preferably in a power station and should have had a thorough practical and theoretical training in mechanical engineering.

The appointment will be superannuable in accordance with the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications, stating age, qualifications, experience, present appointment and salary, should be addressed to the Divisional Secretary, British Electricity Authority, South Western Division, British Electricity House, 26 Oakfield Road, Bristol 8, so as to be received not later than December 3, 1951.

R. C. BARRETT,
Divisional Secretary.

November 13, 1951. (P 197)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

SHIFT CHARGE ENGINEER, DERBY

APPLICATIONS are invited for the post of Shift Charge Engineer at Derby Generating Station.

Applicants should have had a sound training and considerable practical experience in power station operation. The possession of an Ordinary National Certificate in Mechanical or Electrical Engineering or its equivalent will be an advantage.

The salary will be in accordance with Class "F," Grade 7 of the National Joint Board Schedule and the post will be superannuable within the terms and conditions of the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications should be submitted on the official form, which may be obtained from the Divisional Establishments Officer, British Electricity House, Barker Gate, Nottingham, and should be returned to the undersigned to arrive not later than December 5, 1951.

L. F. JEFFREY,
Divisional Controller.
(P 180)

BRITISH ELECTRICITY AUTHORITY

ASSISTANT TO PURCHASING OFFICER

APPLICATIONS are invited for the post of Assistant to the Divisional Purchasing Officer at these headquarters.

Applicants should have experience of buying maintenance supplies, electrical and general engineering equipment as required for generating stations and transmission stations, together with a sound knowledge of internal purchasing procedure including trade inquiries, records, follow up and the organisation of stores.

The salary will be in accordance with Grade 3 of the National Joint Council Agreement (£500-£560 per annum).

The post will be superannuable within the provisions of the B.E.A. and Area Boards' Superannuation Scheme.

Applications should be submitted on the official form which may be obtained from the Divisional Establishments Officer, B.E.A., Barker Gate, Nottingham, and should be returned not later than December 10, 1951.

L. F. JEFFREY,
Divisional Controller.
(P 221)

A LARGE Australian company manufacturing a wide variety of house fittings and domestic appliances (washing machines, refrigerators, etc.) invites applications for the position of WORKS MANAGER. The appointment will carry a high salary but demands more than average technical and administrative ability. Preference will be given to a married man aged between 35 and 40 years of age with good sound practical experience in a similar British concern of undoubted reputation and efficiency. Applicants may rest assured that all correspondence will be treated in strict confidence and therefore they should give fullest possible information as to age, education, experience and positions held.—Write: C. H. Hordern and Co., 69 Connaught Street, London W.2. (P 211)

A VACANCY exists for a SENIOR METHODS ENGINEER at the Stafford Works of the English Electric Co. Ltd., in connection with the production of a wide range of high grade electronic gear including R.F. heaters up to 150 kW. Production development, production methods, shop layout, test, inspection and servicing facilities all come within the scope of this responsibility. Applications are invited from engineers preferably aged 30-40, who : (a) Have served a recognised apprenticeship with an electrical engineering manufacturer; (b) have the Higher National Certificate or equivalent qualification; (c) have had manufacturing experience involving technical responsibility for the production of electronic equipment. The appointed candidate will enter an expanding field with excellent opportunities for advancement. The company will offer help as far as possible in providing housing accommodation.—Write, stating age, qualifications, experience and salary required, quoting Ref. 945, to Central Personnel Services, English Electric Co. Ltd., 24-30 Gillingham Street, London S.W.1. (P 203)

AN INTERESTING VACANCY occurs in the Development Department of a leading firm of electric cooker manufacturers whose works are situated about 30 miles from London. Applicants should hold a degree in physics or engineering and should preferably be under 30 years of age. The work will comprise experimental investigation of a wide range of problems connected with electric cooking and heating equipment. A sound knowledge of fundamental principles is of greater importance than practical experience in this field, but some industrial experience will be regarded as an advantage.—Reply, with full details of age, educational qualifications and practical training to Box No. 1231, Electrical Times. (P 214)

APPLICATIONS are invited from mechanical engineers for the post of CHIEF METHODS ENGINEER in a division of the Stafford Works of the English Electric Co. Ltd., manufacturing a high grade medium engineering product to batch and customers' orders. Product development, production methods and processes, works layout and direction of technical staff all come within the scope of this responsibility. Applicants who should preferably be aged between 30 and 40 should : (a) have served a recognised engineering apprenticeship; (b) have the Higher National Certificate or equivalent qualifications; (c) have had manufacturing experience involving technical responsibility of the class of production defined above. This appointment is of senior status and the company will offer help as far as possible to the successful candidate in finding accommodation, if he is unable to purchase or rent a house privately.—Apply, stating age, qualifications, experience and salary required, quoting Ref. 903A, to Central Personnel Services, English Electric Co. Ltd., 24 30 Gillingham Street, London S.W.1. (P 189)

AUSTRALIA—WORKS MANAGER wanted. Cable factory being erected Fairfield, near Sydney, New South Wales. Proprietors, Enfield Cables Ltd., W. T. Henley's Telegraph Works Co. Ltd., and The London Electric Wire Co. and Smiths Ltd. Experience required in wire drawing and manufacture of mains cables including high voltage, and winding wires. Passages, including fares of wife and family, also reasonable removal costs, will be paid. House provided.—Applications treated in absolute confidence. State full particulars, age, qualifications, experience, salary required, to Box No. 1229, Electrical Times. (P 210)

CONTRACT AND TENDERING ENGINEERS, with experience of l.t. and h.t. switchgear up to 11 kV required for switchgear department. Knowledge of 33 kV gear an advantage. Non-contributory pension scheme. Five-day week. Age 21 to 30. Possible housing assistance.—Please apply, giving details of training, experience, age, etc., to Central Labour Dept., The Brush Electrical Engineering Co. Ltd., Loughborough, Leics. (P 194)

CONTRACTS ENGINEER required. Applicants should have knowledge of small rotary electrical equipment. Age 25-35. Salary from £430 according to experience.—Please apply to Personnel Manager, Small Electric Motors Ltd., Churchfields Road, Beckenham, Kent. (P 242)

BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London W.C.2

DEPUTY WORKS MANAGER for sign and general engineering factories. Sound electrical and engineering knowledge combined with commercial common sense. State age and salary.—Box No. 1235, Electrical Times. (P 218)

DRAUGHTSMEN, ELECTRICAL, required for diagrams, cabling and electrical plant layout, etc. Excellent opportunity for experience in modern power station o.h. transmission and sub-station practice up to 275 kV. Good salaries for suitable men. Pension fund.—Write, giving age, details of training, experience and salary required to Box No. 735, c/o Walter Judd Ltd., 47 Gresham Street, London E.C.2. (P 204)

DRAUGHTSMEN. Seniors and juniors required for switchgear design and application, previous experience not essential.—All enquiries to be addressed to the "Personnel Officer," B.T.H. Co. Ltd., 20 Neasden Lane, Willesden N.W.10. (P 229)

ELECTRICAL ENGINEER required for South American Oilfield. Free passage and free quarters. Cost of board for own account, but cost-of-living allowance in local currency.—Write, stating experience and salary required.—Box No. 738, c/o Walter Judd Ltd., 47 Gresham Street, E.C.2. (P 201)

ELECTRICAL ENGINEER, H.N.C. standard, is required for experimental work with circuitry gear for discharge lamps.—Apply to the Staff Manager (Ref. GBLC/O/294), Research Laboratories of The General Electric Co. Ltd., East Lane, North Wembley, Middlesex, stating age, qualifications and experience. (P 191)

ELECTRICAL ENGINEER required for S.W. England, age 30/35. Should be a corporate member of the I.E.E., have served engineering apprenticeship and have had several years responsible experience in design, specification, construction, installation and maintenance of all types of industrial electrical equipment. Starting salary £750 to £850 per annum, according to age and experience.—Full details of education, training and experience to Box No. T.6536, Haddons, Salisbury Square, Fleet Street, London, E.C.4. (P 159)

ELECTRONIC ENGINEER, with good theoretical background to Higher National Certificate standard and with practical experience in use of valves in audio and radio frequency circuits, is required in the Valve Life Testing Laboratory at the G.E.C. Research Laboratories, Wembley, Middlesex.—Apply to the Staff Manager (Ref. GBLC/O/266), stating age and record. (P 222)

ELMA/EDLAC/ELFA Company, Central London, require LIGHTING ENGINEERS experienced in preparation of lighting schemes covering industrial, street lighting, commercial and decorative classes of installations, etc. I.E.S. registration and experience in personal contact with clients preferable. Pension scheme. State age, experience, salary.—Box No. 1243, Electrical Times. (P 236)

EXPERIENCED ENGINEERS accustomed to the erection of lattice tower, concrete and wood pole overhead transmission lines and willing to serve either at home or overseas, age 25-45. Good prospects and pension.—Apply, in writing, giving full details to Staff Officer, British Insulated Callender's Construction Co. Ltd., 21 Bloomsbury Street, London W.C.1. (P 199)

FIRST-CLASS EXPERIENCED DRAUGHTSMAN required West London for interesting work on small mass produced electro-mechanical devices. Good salary above A.E.S.D. rates paid to suitable man.—Details of experience and salary required to Box No. 1225, Electrical Times. (P 200)

MERCURY arc rectifiers. Vacancy for JUNIOR DESIGN ENGINEER for work of exceptional interest with good prospects. Previous rectifier experience not necessary, but Honours, Degree and some works training essential.—Apply to: Manager, Rectifier Engineering Dept., The British Thomson-Houston Co., Ltd., Rugby. (P 124)

NEON TUBE BENDERS AND PUMPERS urgently wanted. Top rates and scope for advancement. Manchester works. Excellent position for an experienced man on the above and powdered tubes.—Replies to Taylor Electronics Ltd., Grange Works, 15 Lostock Road, Davyhulme, Manchester. (P 196)

REQUIRED, ASSISTANT WORKS MANAGER. Manufacturing company employing 70 people, S.E. London. Must be conversant with transformer and electrical assemblies. Good disciplinarian over male and female labour. Excellent prospects for right man.—Write, giving previous experience and salary required, to Box No. 1237, Electrical Times. (P 219)

RESISTANCES.—ENGINEER wanted to handle application, design and quotations for unbreakable resistances for traction and industrial motor control. H.N.C. or equivalent. Age 24-30.—State experience and salary required to The Rheostatic Co. Ltd., Slough, Bucks, marking envelopes "D.H.S. Confidential". (P 185)

REPRESENTATIVE required to take charge of Bristol branch ELMA firm. Own car an advantage.—Write details of experience to Box No. 1241, Electrical Times. (P 230)

SENIOR SWITCHGEAR DESIGNER required to take charge of 33 kV metalclad and outdoor equipment designs, some experience at higher voltage an advantage. Post offers excellent opportunities for advancement with increasing responsibilities. House available married man, superannuation scheme.—Applications, giving age, experience, etc., and salary required, to Personnel Manager, South Wales Switchgear Ltd., Blackwood, Mon. (P 224)

TEMPERATURE CONTROL.—ENGINEERS wanted for sales and contracts office of manufacturers of automatic temperature control equipment. H.N.C. or equivalent. Age 22-28.—State experience and salary required to The Rheostatic Co. Ltd., Slough, Bucks, marking envelopes "D.H.S. Confidential". (P 186)

THE BRUSH ELECTRICAL ENGINEERING CO., LTD., Loughborough, Leics, invites applications from experienced DRAUGHTSMEN. Excellent working conditions, canteen facilities, etc.—Applicants should write, giving full details of training and experience, to the Central Labour Dept. (P 215)

THE BRUSH ELECTRICAL ENGINEERING CO., LTD., Loughborough, Leics, invites applications from INSTRUMENT TRANSFORMER DRAUGHTSMEN with experience on current and potential transformers for systems up to at least 33 kV.—Applicants should write, giving full details of training and experience, to the Central Labour Dept. (P 216)

TRANSFORMER DESIGNER with experience of all types of distribution transformers up to 2,000 kVA.—Particulars of experience, age, salary, Lindley Thompson Transformers, St. Mary's Road, Slough. (P 130)

WANTED, ELECTRICAL ENGINEER, A.M.I.E.E. or equivalent, aged 30-50, by manufacturers of fine and technical chemicals in East London, to supervise maintenance and installation of a.c. and d.c. motors, generators, switchgear, cables, etc. Knowledge of Factories Act desirable and experience of chemical plant advantageous. Starting salary £600-£800, according to age, qualifications and experience. Temporary hostel or lodgings accommodation available if required.—Box No. 1227, Electrical Times. (P 202)

WANTED, REPRESENTATIVES in all parts of Great Britain to handle cold cathode lighting fittings and neon signs, especially salesmen calling on electrical factors and authorities, as an additional source of income. Good commission on competitive price guaranteed product.—Replies to Taylor Electronics Ltd., Grange Works, 15 Lostock Road, Davyhulme, Manchester. (P 195)

WIMBLEDON STADIUM require a qualified ELECTRICIAN with some experience of engineering.—Apply in writing to the Secretary, Wimbledon Stadium, Plough Lane, S.W.17, stating age, qualifications, experience and salary required. (P 144)

APPOINTMENTS WANTED

HIGHLY QUALIFIED ENGINEER, 36, good personality and excellent linguist, widely travelled, offers services as technical liaison officer or representative abroad.—Box No. 1239, Electrical Times. (P 227)

WORK WANTED

A.C. and d.c. Motor Rewinds and Repairs. Prompt service, fully guaranteed. Edgware 8631 (4 lines).—Service Electric Co., Ltd., Stanmore, Middx. (D 324)

CABLE JOINTING to 11,000 V.—William H. Barnett and Sons, Cherry Cottage, Love Lane, Iver, Bucks. Tel.: Iver 1090. (P 114)

CAPACITY available for soft grey iron machine moulded REPETITION CASTINGS, ½ lb to 20 lb.—The Leicester Foundry Co., Ltd., Blaby Road, South Wigston, near Leicester. (P 239)

CASTINGS. Fisher Foundries, Ltd., Greet, Birmingham, have capacity for brass, gun metal and soft grey iron machine moulded repetition castings weighing 1-30 lb. Loose pattern work up to 3 cwt. Delivery by road to all parts. Tel.: B'ham, Victoria 0197. (L 318)

REWINDS, REPAIRS and CONVERSIONS, large and small. Industrial installations, plant maintenance. Prompt efficient service, moderate charges.—Magstarlite Ltd., Beavor Works, Beavor Lane, Hammersmith, London W.6. Tel.: Riverside 4291. (P 128)

WANTED

A.C./D.C. MOTORS, STARTERS, complete change-over installation, etc.—A.A. Electrical Co., Ltd., 67 Rothschild Road, Chiswick Park, W.4. Tel.: Chiswick 5105. (A 20)

BEST prices and a square deal offered in cash for ALUMINIUM, BRASS AND COPPER in sheets or rods. Works clearances and scrap a speciality.—Dyas and Fowle, 41 Loudoun Road, London N.W.8. Maida Vale 5477, 8641 and 5489. (N 61)

DIESEL-ELECTRIC GENERATING SETS urgently required. 50 to 500 K.V.A. and good-class Diesel Power Plants of all kinds. Prompt inspection and good price offered.—F. J. Edwards Ltd., 359 Euston Road, London N.W.1. Tel.: Euston 4681, or 41 Water Street, Birmingham 3. Tel.: Central 7606. (P 244)

MOTOR GENERATOR SET. Input 400/440 V, 3 phase, 50 cycles. Output 150 kW 112 V d.c.—Oldfield Engineering Company Limited, 96 East Ordsall Lane, Salford 5. (P 187)

PAPER and cotton covered rectangular COPPER WINDING WIRES.—Please submit details in full to Box No. 1223, Electrical Times. (P 193)

PYROTENAX CABLES, etc., long or short lengths, particularly 1x.06 and 1x.15.—Fisher Electrical, 49 Graham Road and 199-205 Richmond Road, London, E.8. (P 240)

SCRAP ACCUMULATOR PLATES and Sediment wanted, any quantities. Also Storage Batteries purchased and dismantled.—Phone or write, Elton Levy Co. Ltd., St. Ermin's (West Side), Caxton Street, London S.W.1. Tel.: WHItehall 9621/2/3. (A 3)

WANTED, ROTARY CONVERTORS, any size.—Universal, 221 City Road, London, E.C.1. (A 16)

WANTED for prompt cash, ferrous and non-ferrous SCRAP; also plant for dismantling. Buyers of second-hand machinery and plant for re-use.—W. and H. Cooper, Ltd., 176 Brady Street, Bethnal Green, E.1. (A 1)

WANTED. Large quantity of 4-in. outside diameter TUBES from the dismantling of old Babcock Water-tube Boilers. Best prices paid. Prepared to purchase Babcock and Wilcox Water-tube Boilers for dismantling. —Apply, giving full details to Midland Iron and Hardware Co., Cradley Heath. (A 5)

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DIESEL GENERATOR SET. Petter 3 cyl. 168 B.H.P. engine. 410 r.p.m. B.T.H., 160 kW d.c. generator, 230 V, 696 amps, 325 r.p.m. M.D. compressor, 3 phase.—Full details, photo, F. J. Edwards Ltd., 359 Euston Road, London N.W.1. Tel.: Euston 4681. (P 212)

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COMPLETE G.E.C. FUSE BOX, wired for cooker 5-15 amp fuse tappings and 2-5 amps. With pilot lights, suitable for complete house wiring. Surplus to requirements. View by appointment. Tel.: Streatham 4419. (P 225)

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A.C. and D.C. MOTORS, all sizes, large stocks fully guaranteed.—Milo Engineering Works, Ltd., Milo Road, East Dulwich, S.E.22. (Forest Hill 2278-9). (A 10)

FOR ELECTRICAL MOTORS, GENERATORS, ALTERNATORS, SWITCHGEAR, please send your inquiries to Oldfield Engineering Co., Ltd., 96 East Ordsall Lane, Salford 5. (C 296)

SPECIAL offer 25 new 1 6-h.p. cap. MOTORS, 230/1 50. 1,425 revs., B.T.H.—Sugdens, Glenny Rd., Barking. (P 188)

TWO Higgs 400-volt, 3-phase, 50-cycles geared MOTOR UNITS; 2 h.p., 95 r.p.m.—Box No. 1205, Electrical Times. (P 149)

SWITCHGEAR

MERCURY SWITCHES are made by Hall Drysdale and Co., Ltd., of 58 Commerce Road, Wood Green, London N.22. Tel.: Bow 7221. (C 175)

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1,200 MAIN TRANSFORMERS, 230 V to 2 V 1 amp. output for sale. Special small design, 1⅞ in. by ¾ in. by 1⅛ in., price 2s. 5d. each.—Apply to Belark Tool and Stamping Co, Ltd., 33 Sussex Place, W.2. (P 190)

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SWITCHGEAR. Two 300 amp. h.t. draw-out type Switch Cubicles by Ferguson Pailin; 11 kV, rupturing capacity 50 MVA, complete with all instruments, etc. BATTERIES. 150 amp. hour Alklum Alkaline Battery by Britannia Batteries, type K.15H, having 24 units each of 8 cells, carried on timber battery stand, complete with 2 Westinghouse Metal rectifiers and Westinghouse charging and control board.—B.C.S. (Engineers and Contractors) Ltd., 3 Castle Street, Cardiff. Tel.: Cardiff 8512-3-4. (P 79)

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ELECTRICAL CONTRACTORS and manufacturing business, North Lincs. Regular work with builders, Ministry of Works, County Council, steel works, breweries, etc. Large workshop, with office, tools and machinery. Good stock. Lovely modern house in good district. Good profits, reliable staff, good reason for sale. Telephone at both workshop and house. Inspection welcomed. All in price for quick sale £4,500 (Four Thousand Five Hundred). —Thompson, Colin Road, Scunthorpe, Lincs. (P 192)

MISCELLANEOUS

THE ASSOCIATION OF SUPERVISING ELECTRICAL ENGINEERS

SWANN DIPLOMA EXAMINATIONS

NOTICE IS HEREBY GIVEN that the Swann Diploma Examinations will be held at Centres on May 21 and 22, 1952.

Subjects: Electrical Installation Practice. Electrical Maintenance.

Application forms and copies of regulations and syllabus may be obtained from the General Secretary, The Association of Supervising Electrical Engineers, 54 Station Road, New Barnet, Herts.

The latest date for receipt of application forms is March 1, 1952.

A. BRAMMER,
General Secretary.

November, 1951. (P 213)

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RICHARDS AND PARTNERS, associated with George Offord and Co., Auctioneers and Valuers of PLANT AND MACHINERY AND INDUSTRIAL PROPERTY, Granville House, Arundel Street, London W.C.2. Tel.: TEMple Bar 7471. (A 23)

THE following PATENTS are offered for sale or licence: No. 635799 "CIRCUIT INTERRUPTING DEVICES" and No. 642176 "HIGH TENSION SWITCH".—Apply to Chatwin and Co., Patent Agents, 253 Gray's Inn Road, London W.C.1. (P 247)

Once dermatitis gets to work—hands are soon out of work. Hands which are in constant contact with industrial irritants—insulating varnish, shellac, transformer and lubricating oils—need a constant safeguard. By acting as a barrier against dermatitis, Rozalex keeps all hands active on the job. There is a type for every trade.

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DERMATITIS BARRIER PREPARATIONS

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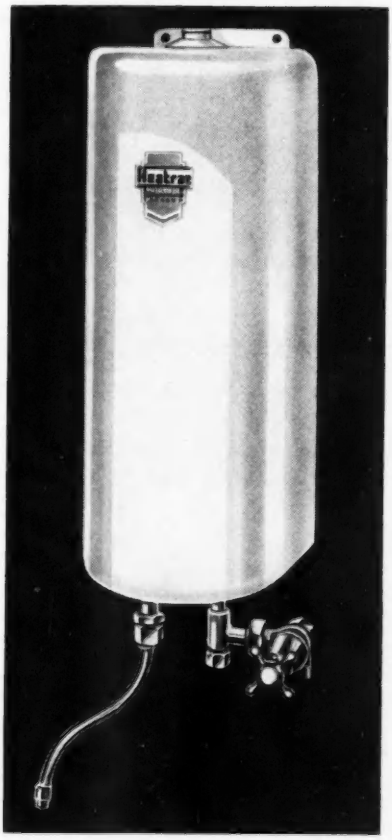

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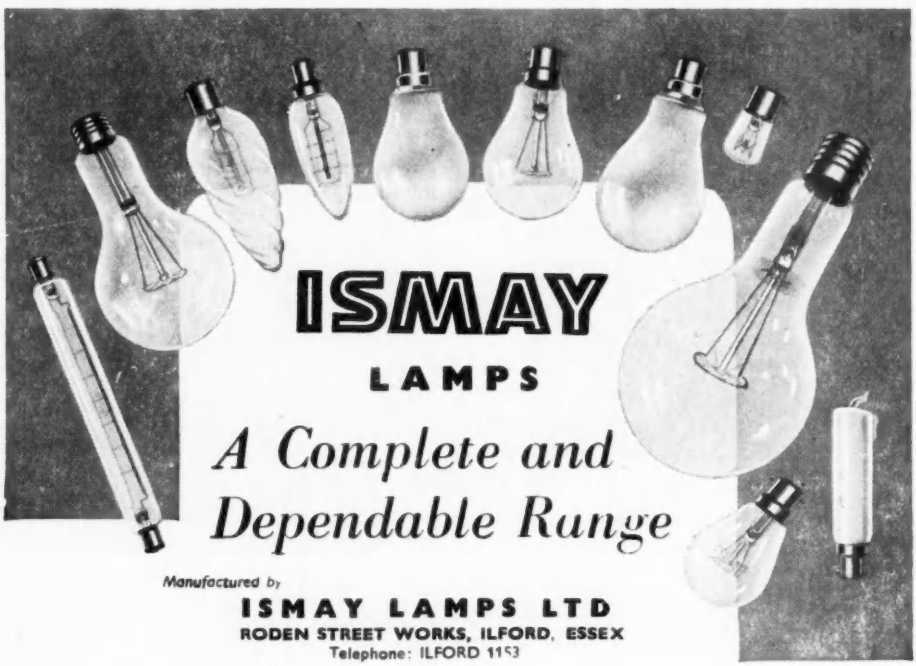

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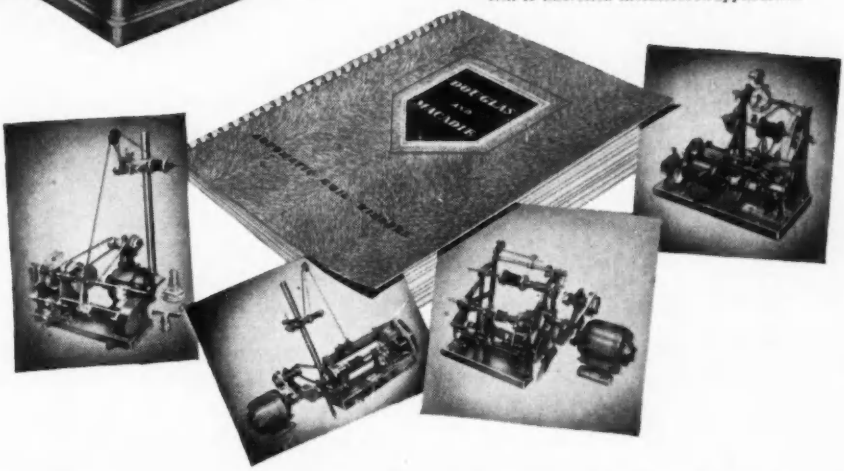

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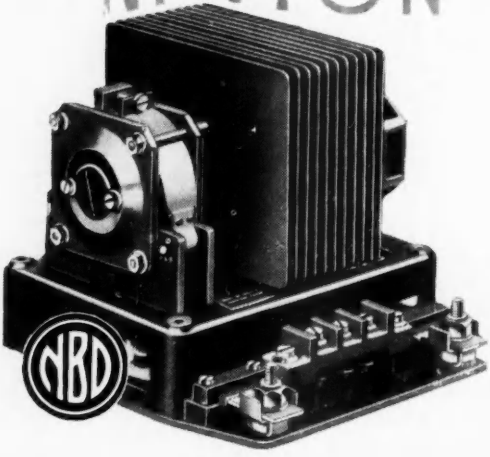

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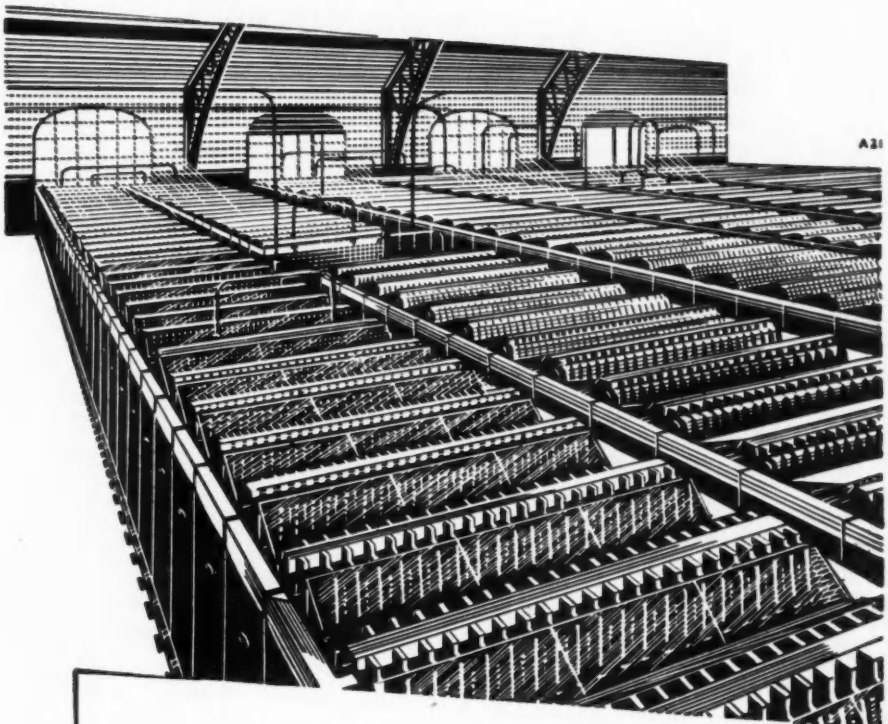

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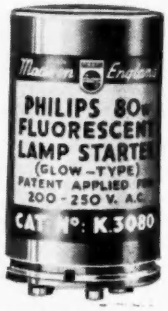
★★★★★  ★★★★★

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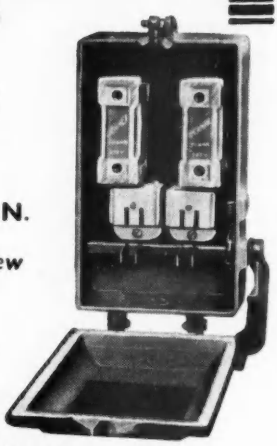

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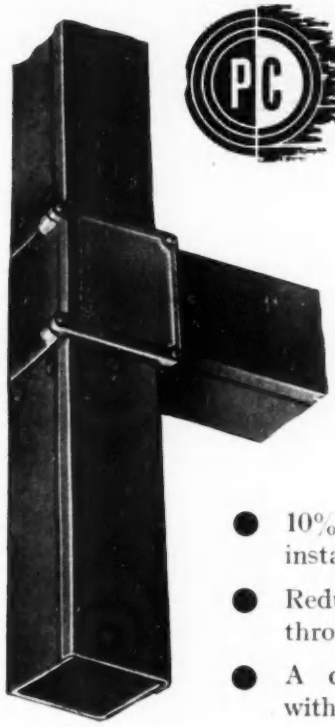

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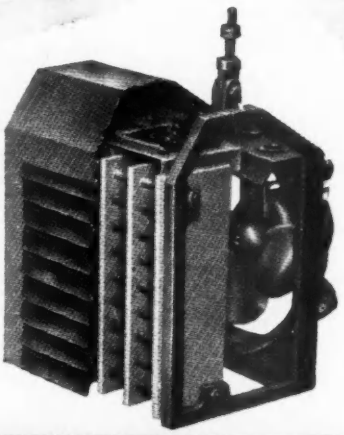

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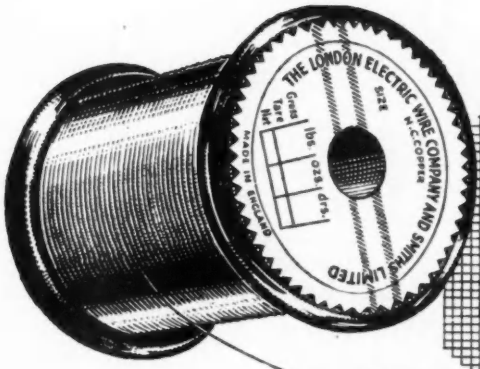

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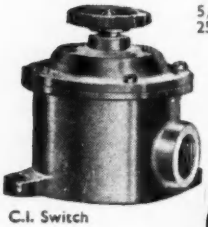
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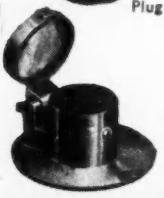
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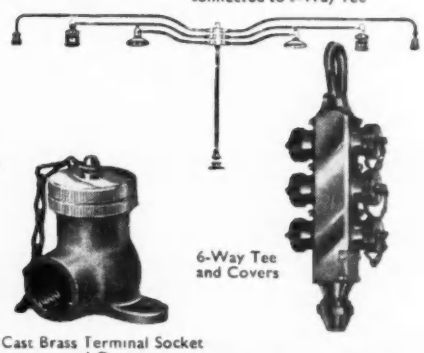
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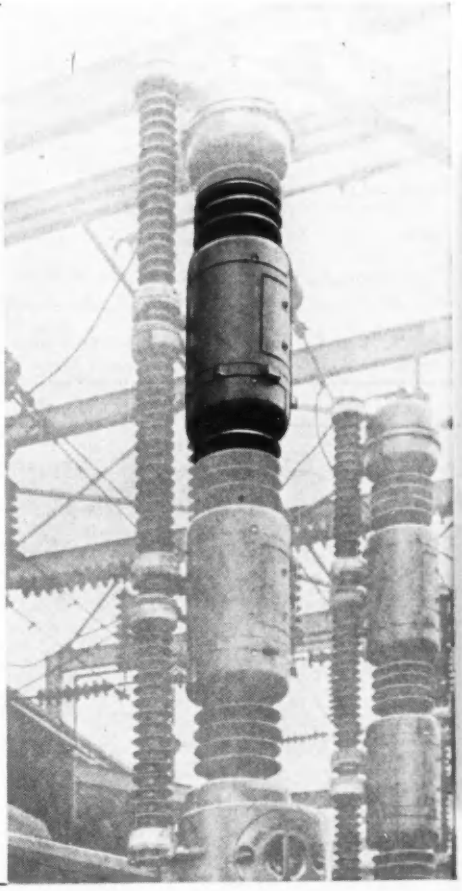

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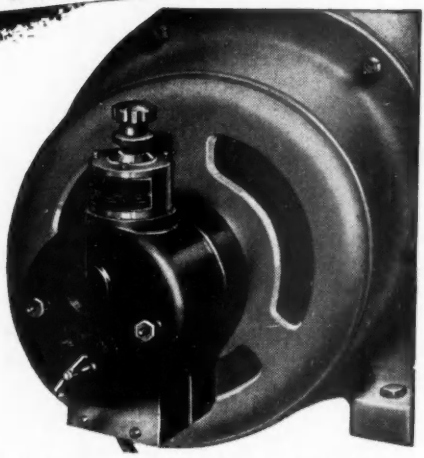

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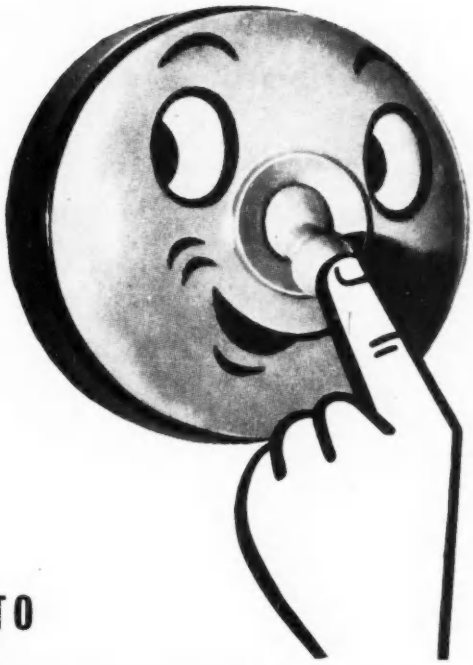

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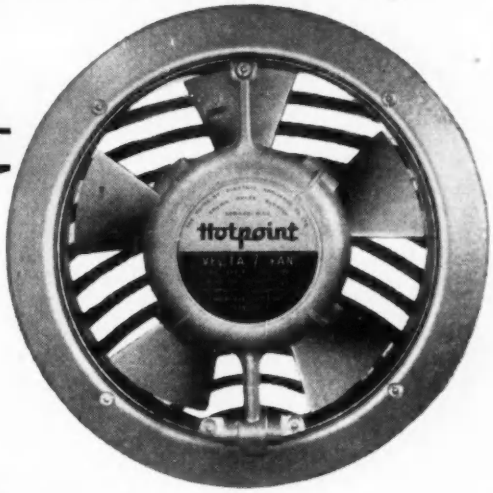

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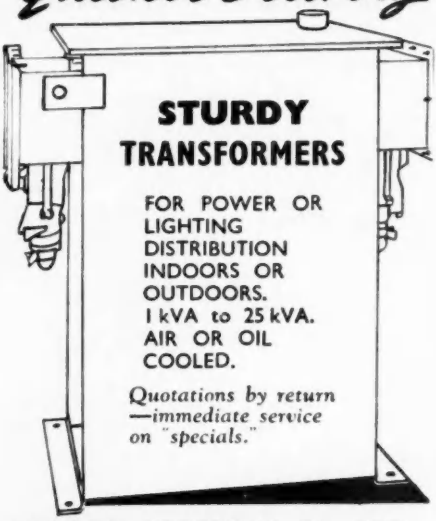

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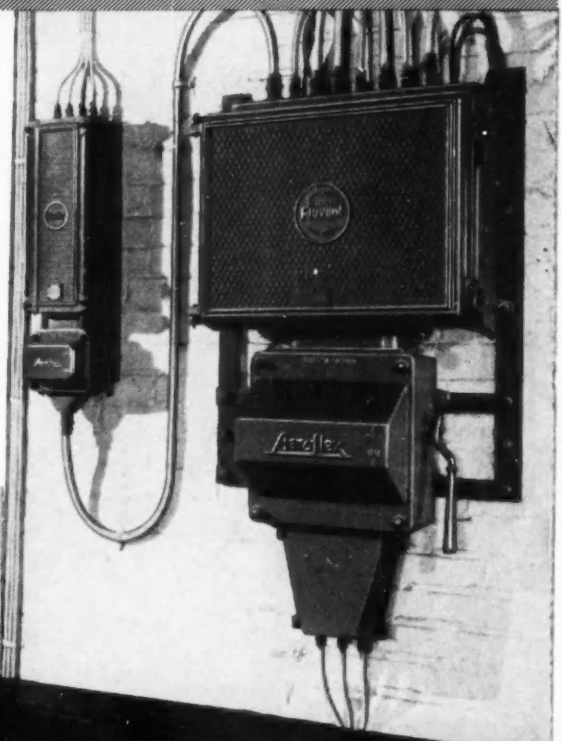

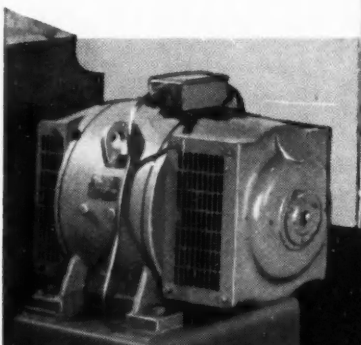

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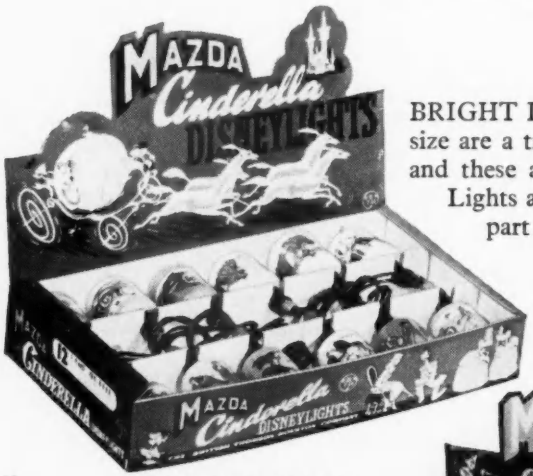

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